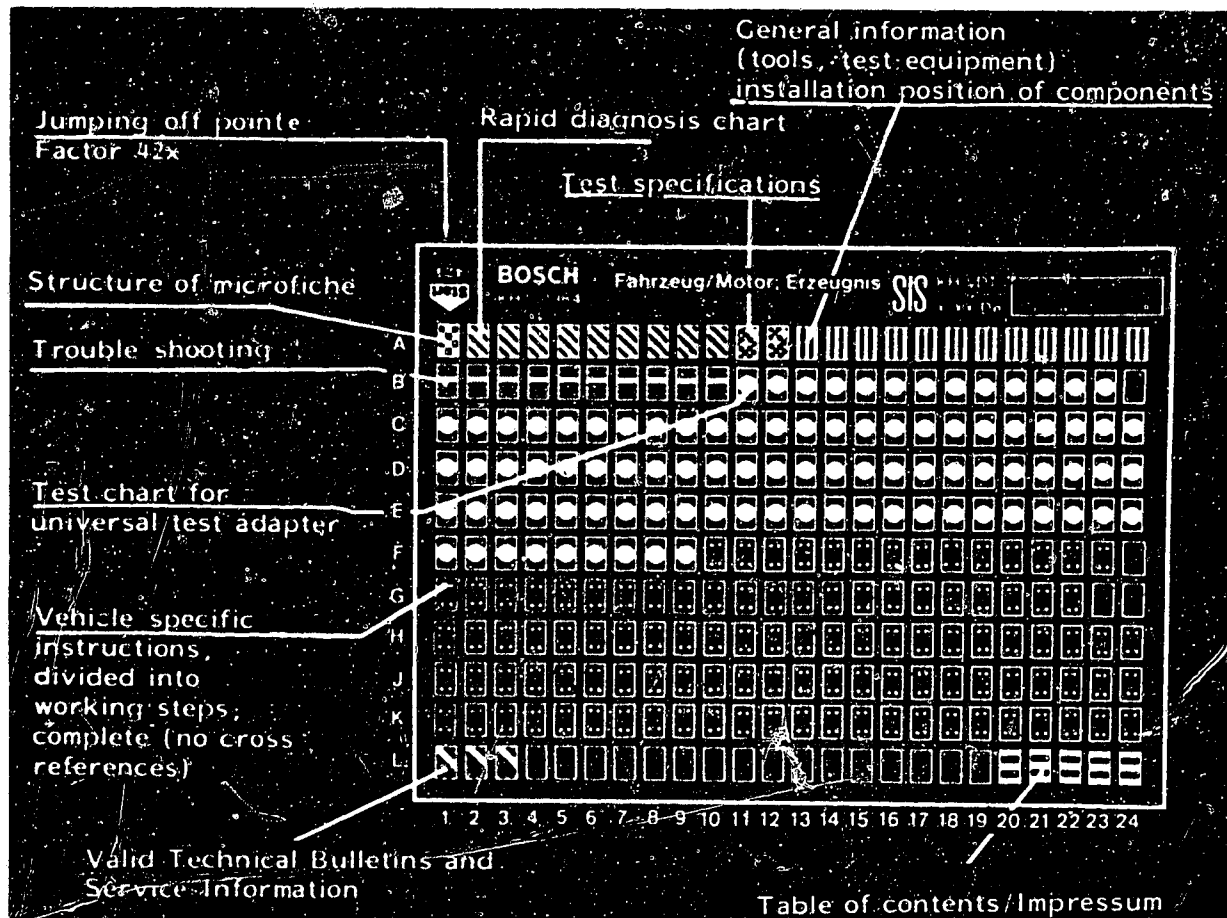


Structure of microfiche

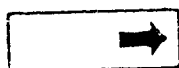


1. Read from left to right
2. Title of microfiche (appears on each coordinate)

E16	Product/component/test step
	Vehicle/engine

Coordinate

3. Limits of section



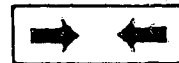
Beginning



Mid-section



End



One-page section

4. Purely vehicle-specific passages in the text are marked with a vertical bar.

5. Reference to relevant working steps in the test specifications, e.g. coordinate C6.

C6

A1

Trouble-shooting program



1. Rapid diagnosis chart for universal test adapter

The following rapid diagnosis chart makes it possible for the experienced Motronic expert to quickly check the electrical part of the system using the universal test adapter.










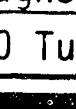
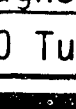
The rapid diagnosis chart contains the following information:

- Switch positions on universal test adapter
- Sequence of test steps
- Notes on how to operate the universal test adapter or other components
- Readings on the multimeter and motortester
- References to coordinates of the relevant detailed testing and trouble-shooting program.

If detailed information and instructions are necessary, always proceed according to the trouble-shooting program starting on Coordinate B1/B2.



Rapid diagnosis chart for universal test adapter

Test step	Switch position		Remarks	Test specifications (reading)	For trouble-shooting see Co-ordinate
	V	Ω			
1		1	Shift gear to neutral, ignition off. Disconnect control unit and relay set. Measure insulation resistance of engine-speed sensor. Term 8 against term. 5	Greater than 1M Ω	B 18
2		2	Measure insulation resistance of reference-mark sensor. Term. 25 against term. 5	Greater than 1M Ω	B 20
3		3	Measure winding resistance of engine-speed sensor. Term. 8 against term. 27	0.6 ... 1.6 k Ω	B 22
4		4	Measure winding resistance of reference-mark sensor. Term. 25 against term. 26	0.6 ... 1.6 k Ω	C 3
5		5	Measure resistance of engine temperature sensor (NTC II). Term. 13 against term. 5	At + 15°C to + 30°C: 1.45 ... 3.3 k Ω (depends on temperature)	C 7
6		6	Measure resistance of air temperature sensor (NTC I). Term 22 against term. 5	At + 15°C to + 30°C: 1.45 ... 3.3 k Ω (depends on temperature)	C 9
7/8		7/8	Deleted	-----	-----
9		9	Accelerator in rest position. Measure resistance of idle contact.	Less than 10 Ω	C 11
10		10	Deleted	-----	-----
11		11	Measure resistance. Ground term. 16 against term. 5	Less than 10 Ω	C 15
12		12	Measure resistance. Ground term. 17 against term. 5	Less than 10 Ω	C 17

A3

Rapid diagnosis chart
Volvo 760 Turbo



A4

Rapid diagnosis chart
Volvo 760 Turbo



Rapid diagnosis chart for universal test adapter (continued)

<u>Test step</u>	<u>Switch position</u>		<u>Remarks</u>	<u>Test specifications (reading)</u>	<u>For trouble-shooting see Co-ordinate</u>
	V	Ω			
13	↓	13	Measure resistance. Ground term. 19 against term. 5	Less than 10 Ω	C 19
14	↓	14	Measure resistance of charge-air temperature sensor. Term. 30 against term. 5 (ground)	At + 15°C to + 30°C: 0.9 ... 1.1 k Ω (depends on temp.)	C 21
15	↓	15	Deleted	----	-----
16	1	15	Measure signal with oscilloscope. Engine-speed sensor term. 8 against term. 27 Shift gear to neutral and start.		D 1
17	2	15	Measure signal with oscilloscope. Reference-mark sensor term. 25 against term. 26. Shift gear to neutral and start.		D 7
18/19	3/4	15	Deleted	-----	-----
20	6	15	Ignition off. Connect control unit and relay set. Ignition on. Measure voltage at main relay. Term. 35 against term..5.	10 ... 15 V	D 13
21	7	15	Measure voltage at main relay. Term. 18 against term. 5.	10 ... 15 V	D 15
22	5	15	Measure ignition signal with oscilloscope. Shift gear to neutral and start. Control unit, ignition stage term. 1 against term. 5 Evaluation: Signal present.		D 17

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Rapid diagnosis chart
Volvo 760 Turbo



A6

Rapid diagnosis chart
Volvo 760 Turbo



Rapid diagnosis chart for universal test adapter (continued)

<u>Test step</u>	<u>Switch position</u>		<u>But-ton</u>	<u>Remarks</u>	<u>Test specifications (reading)</u>	<u>For trouble-shooting see Co-ordinate</u>
	V	Ω				
23	8	15		Measure voltage at control unit. Term. 9 against term. 5	<u>Greater than 7 V</u>	D 19
24	9	15		Measure voltage at air-flow sensor. Term. 7 against term. 5 Sensor flap in rest position:	100 ... 250 mV	D 12
				Sensor flap open:	<u>Greater than 7 V</u>	
25	10	15		Deleted	-----	-----
26	11	15		Measure voltage between term. 28 and term. 5. Switch on air conditioner.	<u>0 V</u> (only if air conditioner)	D 23
27	12	15		Measure voltage. Starting signal term. 50. Term. 4 against term. 5	<u>8 ... 15 V</u>	E 1
28	13	15		Test dwell-period signal t_s from control unit with oscilloscope. Term. 21 against term. 5 Shift gear to neutral and start.		E 3
29	14	15		Test injection signal t_i from control unit with oscilloscope. Term. 14 against term. 5. Shift gear to neutral and start.		E 5
30	14	15	T 1	As 29, but after pressing button (NTC II, cold) duration of injection becomes slightly longer.		E 7
31	15	15		As test step 29, but term. 15 against term. 5		E 9
32	16	15		Measure injection signal t_i from control unit with oscilloscope. Term. 11 against term. 5. Shift gear to neutral and start.		E 11

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Rapid diagnosis chart
Volvo 760 Turbo



A8

Rapid diagnosis chart
Volvo 760 Turbo



Rapid diagnosis chart for universal test adapter (continued)

<u>Test step</u>	<u>Switch position</u>		<u>But-ton</u>	<u>Remarks</u>	<u>Test specifications (reading)</u>	<u>For trouble-shooting see Co-ordinate</u>
	V	Ω				
33	17	15		Measure voltage at pump relay term. 20 against term. 5. Ignition on.	<u>10 ... 15 V</u>	E 13
34	17	15		Measure voltage. Shift gear to neutral and start. Control unit, pump control active. Term. 20 against term. 5	<u>Max. 4 V</u>	E 15
35	17	15	T 3	Ignition off. Connect pressure gauge. Ignition "ON". Press button T 3. Read off fuel pressure.	<u>2.8 ... 3.2 bar</u>	E 17
36	17	15		Connect motortester. Connect CO analyzer. Let engine run. Switch off air conditioner (if applicable). Test idle speed and CO.	<u>850 min⁻¹</u> <u>1.0 ... 2.5%CO</u>	E 23
	17	15	T 2	As above, values unchanged.	Setting value 1.5%CO	
37	17	15		Let engine run. Test spark advance at idle speed. Important! Idle speed must be between 800 and 900 min ⁻¹ . Otherwise other spark advance angles are indicated. Switch off air conditioner (if applicable).	<u>5° ... 15°</u>	F 3
				If applicable: Switch on air conditioner.	<u>22° ... 32°</u>	
38	17	15		Dwell angle at idle speed	<u>8° ... 15°</u>	F 5
				Dwell angle at 3000 min ⁻¹	<u>30° ... 45°</u>	
39	17	15	T 5	Hold engine speed constant at 2000 min ⁻¹ . Press button T 5. Injection signals stop and are reinstated at approx. 1200 min ⁻¹ .	<u>Engine "hunts"</u>	F 7

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Rapid diagnosis chart
Volvo 760 Turbo



A10

Rapid diagnosis chart
Volvo 760 Turbo



2. TEST SPECIFICATIONS

Idle speed:

850 min⁻¹

B7

Exhaust-gas setting

CO checking value with engine
at normal op. temp.:

1.0 ... 2.5% by vol. CO

CO setting value:

1.5% by vol. CO

Fuel pressure:

2.8 ... 3.2 bar

Fuel pump delivery:

Min. 850 cm³/30 s

See equipment and Autodata microfiches for settings
for ignition, valve clearance and other engine data.

Solenoid-operated injection
valve

Electrical internal resist-
ance:

2Ω ... 3Ω

Air-flow sensor

Resistance between
term. 7 and term 6:

8Ω ... 2500Ω

(Deflect sensor flap)

Term. 9 and term. 6:

500Ω ... 1100Ω

Auxiliary-air device

Electrical internal resist-
ance:

40Ω ... 75Ω

Charge-air temperature
sensor

Electrical internal resist-
ance

at +15°C ... +30°C

900 ... 1100 Ω

at +80°C:

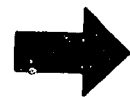
1230 ... 1370 Ω

B7

A11

Test specifications

Volvo 760 Turbo



Temperature sensor I (NTC I air):

Electrical internal resistance

at + 15° C...+30°C: 1.45...3.3 kΩ

measured at air-flow

sensor between terminals

22 and 6 at +80°C: 280...360 Ω

Temperature sensor II (NTC II coolant):

Electrical internal resistance

at + 15°C...+30°C: 1,3 ... 3,6 kΩ

at + 80°C: 250 ... 390 Ω

B 7

Engine-speed sensor and reference-mark sensor

Electrical internal resistance

0.6...1.6 kΩ

B 9

Throttle-valve switch

Resistance of

idle contact (term. 2
and ground):

0 Ω

Full-load contact (term. 3
and ground):

0 Ω

B 7

Start valve

Electrical internal resistance:

Approx. 4 Ω

Thermo-time switch

35°C/7.5 s

Electrical internal resistance:

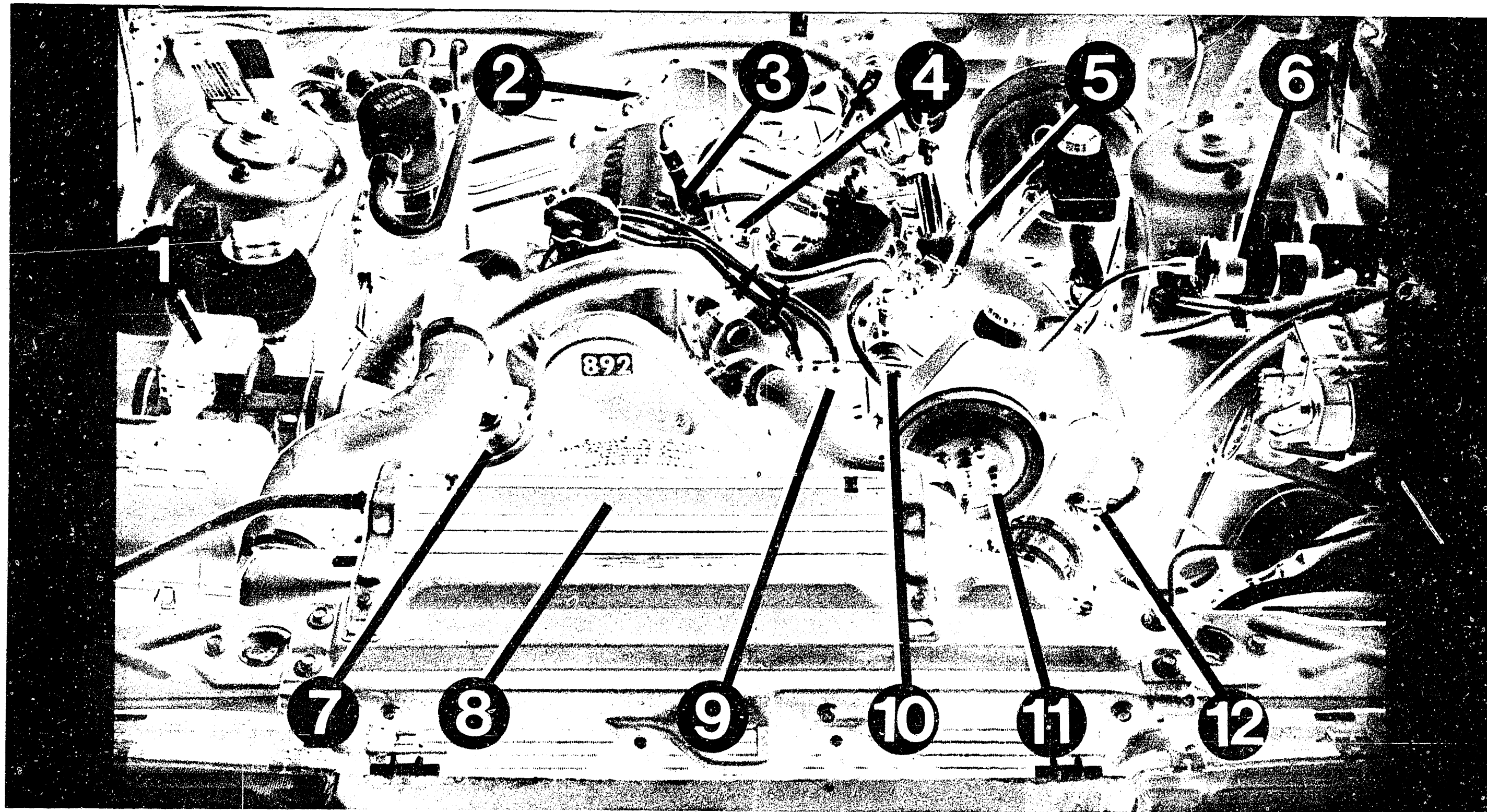
	"G" and ground	"W" and ground	"G" and "W"
Ambient temp. (below +30°C):	25...40 Ω	0 Ω	25...40 Ω
At op. temp. (above +40°C):	50...80 Ω	100...160 Ω	50...80 Ω

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Test specifications

Volvo 760 Turbo





4. INSTALLATION POSITION OF COMPONENTS

1 = Air-flow sensor
 2 = Connectors for inductive sensors
 3 = Auxiliary-air device
 4 = Injection valves

5 = Throttle-valve switch
 6 = Ignition coil
 7 = Bypass-air valve
 8 = Intercooler

9 = High-voltage distributor
 10 = Pressure regulator
 11 = Air conditioner
 12 = Charge-air temperature sensor

A15

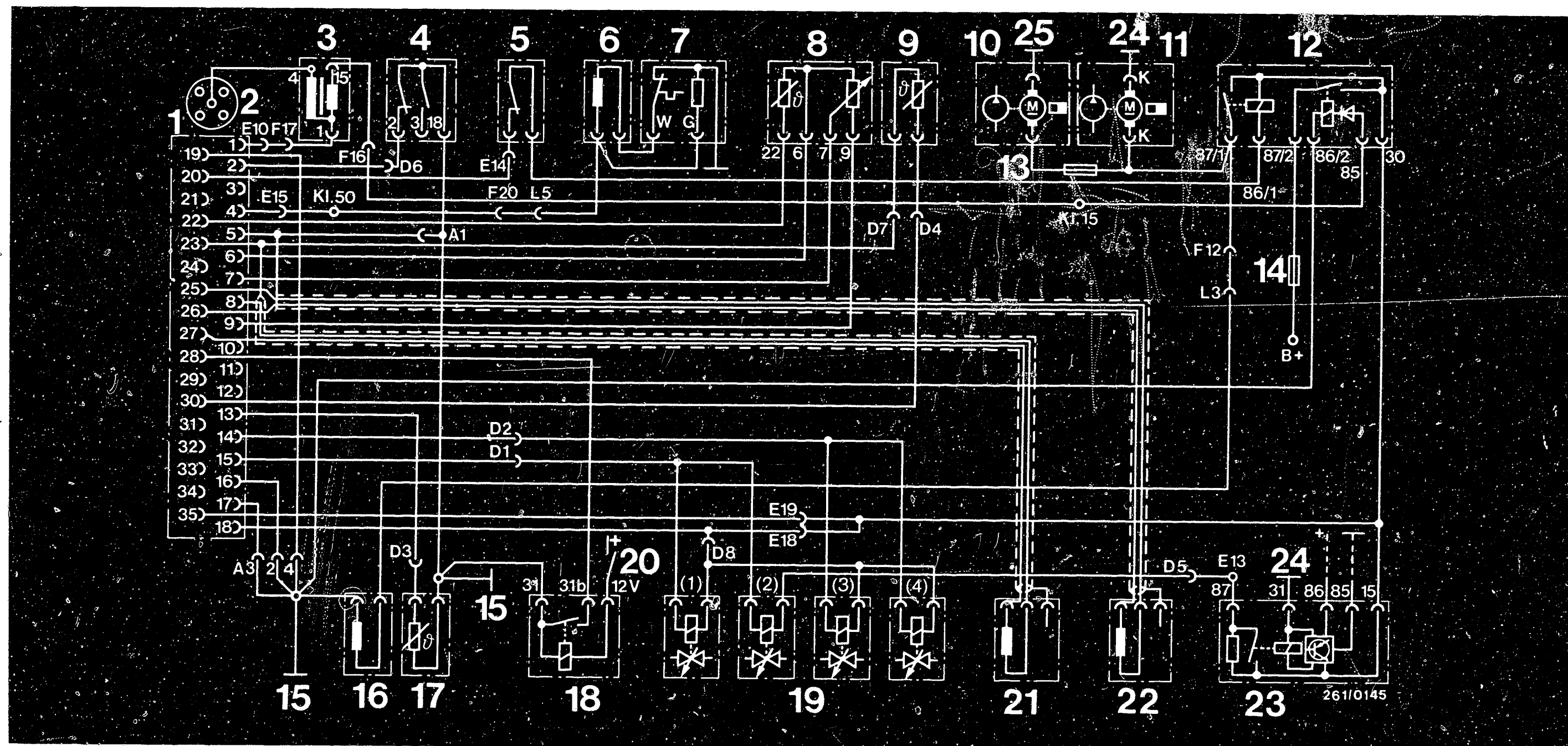
Installation position of components
 Volvo 760 Turbo



A16

Installation position of components
 Volvo 760 Turbo





3. ELECTRICAL TERMINAL DIAGRAM

- 1 = Control unit plug
- 2 = High-voltage distributor
- 3 = Ignition coil
- 4 = Throttle-valve switch
- 5 = Charge-air pressure switch
- 6 = Start valve
- 7 = Thermo-time switch
- 8 = Air-flow sensor with air-temperature sensor (NTC I)
- 9 = Charge-air temperature sensor

- 10 = Pre-supply pump
- 11 = Fuel pump
- 12 = Relay set (main relay and pump relay)
- 13 = Fuse No. 15
- 14 = Fuse No. 1
- 15 = Ground terminals on fuel-distribution pipe
- 16 = Auxiliary-air device
- 17 = Engine-temperature sensor (NTC II)
- 18 = Reed relay for air conditioner (if applicable)

- 19 = (1, 2, 3, 4) = Injection valves
- 20 = Switch for air conditioner (if applicable)
- 21 = Engine-speed sensor
- 22 = Reference-mark sensor
- 23 = Time-delay relay for overdrive
- 24 = Ground bar in central-electrics console
- 25 = Ground terminal in luggage compartment

A - L = Plug-in connections

A13

Electrical terminal diagram
Volvo 760 Turbo



A14

Electrical terminal diagram
Volvo 760 Turbo

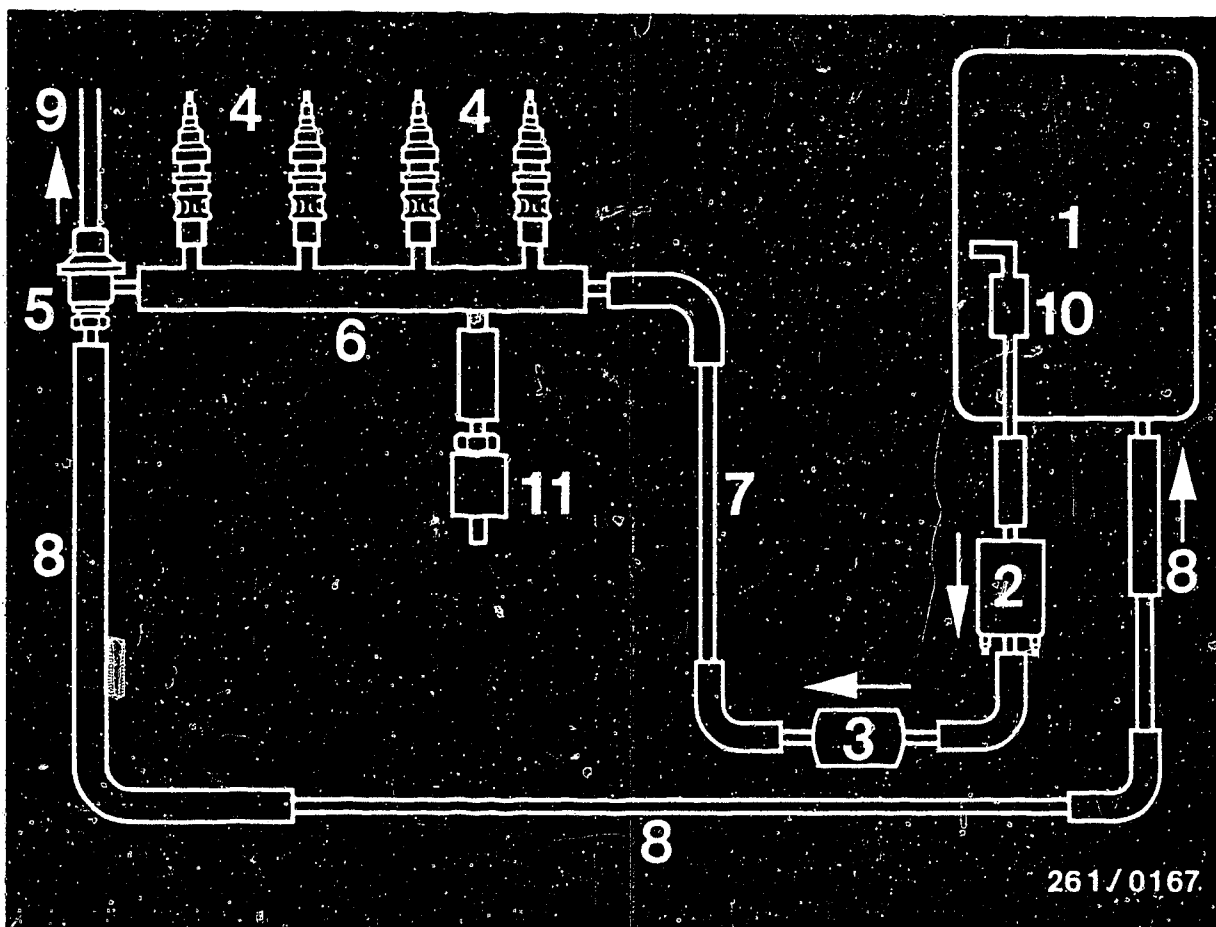


Installation position of components (continued)

The indications "right" and "left" always refer to the forward direction of travel. Listed below are components which are not visible in the picture.

Reference-mark and engine-speed sensors:	In starting-motor ring gear housing at circumference of flywheel ring gear.
Fuel filter and fuel pump:	Underneath vehicle, in center of vehicle.
Pre-supply pump:	In tank
Control unit:	Behind side panelling in right-hand footwell.
Central ground:	Under front fastening screw of fuel-distribution pipe.
Relay set:	In passenger compartment on center console behind ashtray.
Engine-temperature sensor (NTC II):	Underneath intake port of cylinder 3.
Thermo-time switch 35°C/7.5 s:	Underneath intake port of cylinder 4.
Start valve:	On intake manifold (center).
Wastegate:	Near exhaust-gas turbine.
Charge-air pressure switch:	Behind instrument panel, above pedals.





5. Diagram of fuel lines

- 1 = Fuel tank
- 2 = Fuel pump
- 3 = Fuel filter
- 4 = Solenoid-operated injection valves
- 5 = Pressure regulator
- 6 = Fuel-distributor pipe
- 7 = Fuel delivery line
- 8 = Fuel return line
- 9 = To intake manifold
- 10 = Fuel pre-supply pump (in tank)
- 11 = Start valve



6. Test equipment and tools		
Description	Designation	Part No.
Universal test adapter Adapter cable	ETT 018.01	0 684 101 801 1 684 463 124
Motortester	e.g. MOT 002.00 or 200	0 684 000 200
Exhaust-gas analyzer	e.g. ETT 008.04 or ETT 008.05	0 684 100 804 0 684 100 805
Multimeter with (internal resistance min.) 20 k Ω /V)		Commercially available e.g. type MA 2H from Metrawatt or Chinaglia, Cortina model
Pressure tester or Pressure tester (no longer avail- able)	Quality class 1.0 0.1 bar divi- sions	KDJE-P 100 KDEP 1034



<u>Description</u>	<u>Part No.</u>
Lubricant for engine-speed and reference- mark sensors	Molykote Longterm 2, commercially available
Chassis dynamometer e.g. LPS 96 or LPS 002	0 680 017 001 0 680 100 200
Electric connecting cable (test lead) for direct connection of the components under test, e.g. injection valves	KDJE 7450/70

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Test equipment and tools
Volvo 760 Turbo



7. Important general information

This information must be observed in order to prevent damage to the engine, control unit or ignition coil and for the safety of personnel.

7.1 Never start engine without securely connected battery.

7.2 Incorrect polarity of the supply voltage, e.g. by incorrect connection of the battery or ignition coil, can lead to irreparable damage to the control unit.

7.3 Do not use a fast charger for starting the engine.

Use only a second 12 V battery and jump leads.

Caution! Owing to different requirements of vehicle manufacturers with regard to electronic products we advise you not to use 24 V batteries as an aid for starting. Follow the vehicle owners manual.

7.4 Disconnect the battery from the vehicle electrical system before fast charging.



7.5 When charging the battery in the vehicle or when using a starting aid, follow the information in the operating instructions of the fast charger and also follow the information given by the vehicle manufacturer.

7.6 Never disconnect the battery from the vehicle electrical system with the engine running.

7.7 Do not short-circuit ignition coil term. 1 to ground (e.g. for stopping the engine). The ignition coil and possibly the control unit will suffer irreparable damage.

7.8 Never bring the positive pole of the battery into contact with ignition coil term. 1. The control unit will suffer irreparable damage.

7.9 Never connect or disconnect the wiring-harness plug of the control unit with the ignition switched on.

7.10 Remove the control unit at temperatures above 80°C (paint-drying installation).

7.11 Remove the control unit before performing welding work (electric spot welding).

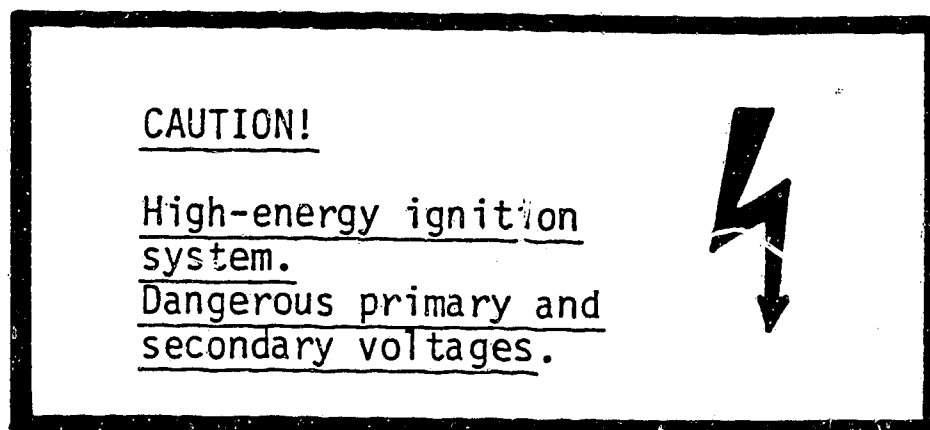
7.12 Remove the relay combination when performing a compression test. This prevents undesired injecting of the injection valves.



7.13 If installing an alarm system, follow the installation instructions for Motronic vehicles or microfiche ALL-500.

It must be ensured that the alarm relay does not suffer interference from stray fields (e.g. from H.T. ignition cables), causing it to trip incorrectly.

7.14



The above sticker has the following meaning:

The Motronic contains a high-performance ignition system which can be dangerous if live parts or terminals are touched (both on the primary as well as secondary sides).



In this connection we should like to point out that the relevant legal regulations concerning work on electrical installations must be observed when testing or working on the ignition system.

The ignition must always be switched off when working on the ignition coil (switch off ignition/voltage source). Such work includes:

- Connection of engine testers (timing light, dwell-tach tester, ignition oscilloscope etc).
- Replacement of parts of the ignition system (spark plug, ignition coil, ignition distributor, ignition cable etc).

If, when testing the ignition system or when performing adjustments on the engine (e.g. carburetor), it is necessary to switch on the ignition (switch on ignition/voltage source), the above-mentioned dangerous voltages occur over the entire system.

There is, therefore, danger of accident not only on the individual components of the ignition system (e.g. ignition distributor, ignition coil, trigger box, ignition harness), but also on the wiring harness (e.g. tachometer connection, diagnostic plug), on plug-in connections and on testers.



8. Trouble-shooting

The following trouble-shooting programs are designed to enable the workshop employees using the Universal test adapter and other suitable testers to quickly detect causes of trouble on the Motronic.

Depending on the level of training and experience of the mechanic a choice can be made between the following procedures:

- Detailed, step-by-step trouble-shooting for employees with little experience or practice on Motronic vehicles.
- Pin-pointed direct trouble-shooting for trained and experienced employees who have a great deal of practice on Motronic vehicles.

B3**B5**

Both trouble-shooting programs start by checking the electrical/electronic part of the Motronic using the Motronic test adapter ETT 018.01. This makes it possible within a short space of time to check the electrical operation of the wiring harness with the connected components (including control unit) and to quickly locate faults.

If no fault is found using the Motronic test adapter, it is necessary to continue with the detailed or the direct trouble-shooting program.

B1

Trouble-shooting
Volvo 760 Turbo

**B2**

Trouble-shooting
Volvo 760 Turbo



8.1 Detailed, step-by-step trouble-shooting

● Test with Motronic test adapter

This test must come at the start of the test program and must be performed from beginning to end (coordinates B 11 ... F 9).

● Trouble-shooting according to customer complaints (fault symptoms)

The table below contains possible fault symptoms and the right-hand column gives the first coordinate of the respective detailed trouble-shooting program.

The trouble-shooting program consists of logically ordered test steps for all individual components of the Motronic. If, after completing the trouble-shooting program for an assumed symptom, the fault has not been located or remedied, choose a new fault symptom and work through the respective program.

<u>Customer complaints (fault symptom)</u>	<u>Test with test adapter</u>	<u>Coordinates</u>
1. Engine fails to start or starts only with great difficulty	B 11	F 10
2. Engine starts but then dies	B 11	G 11
3. Uneven engine idle	B 11	H 1
4. Poor throttle take-up	B 11	H 19
5. Engine missing under all operating conditions	B 11	J 5
6. Fuel consumption too high	B 11	J 17
7. No maximum engine power	B 11	K 1
8. CO concentration at idle too high or too low	B 11	K 15

B3Trouble-shooting
Volvo 760 Turbo**B4**Trouble-shooting
Volvo 760 Turbo

8.2 Pin-pointed, direct trouble-shooting

• Test with Motronic test adapter

The test with the test adapter must come at the start of the test program and must be performed from beginning to end (coordinates B 11 ... F 9).

• Trouble-shooting according to customer complaints

The table below contains various fault symptoms with several possible causes of the fault in each case. The references given on the left indicate the first coordinate of the test step for the respective individual component of the Motronic. If, after testing the individual components, the fault has not been located or remedied, it is necessary to choose a new fault symptom.

Customer complaint (fault symptoms)

1. Engine fails to start or starts only with great difficulty								
2. Engine starts but then dies								
3. Uneven engine idle, idle speed incorrect								
4. Poor throttle take-up								
5. Engine missing under all operating conditions								
6. Fuel consumption too high								
7. No maximum engine power								
8. CO concentration at idle too high or too low								
Cause (component fault)								
B11	B11	B11	B11	B11	B11	B11	B11	Test with universal test adapter
*)								Relay combination (main and pump relay) defective
*)								Electric fuel pump not operating
F20	G15		J 1					Auxiliary-air device not opening
		H 7						Auxiliary-air device not closing
G 7	G21	H 3	H23	J 9	J23	K 5	K 17	Air-flow sensor defective

Continued on B7/B8/B9/B10

B5

Trouble-shooting
Volvo 760 Turbo



B6

Trouble-shooting
Volvo 760 Turbo



Customer complaints (fault symptoms)

1. Engine fails to start or starts only with great difficulty								
2. Engine starts but then dies								
3. Uneven engine idle, idle speed incorrect								
4. Poor throttle take-up								
5. Engine missing under all operating conditions								
6. Fuel consumption too high								
7. No maximum engine power								
8. CO concentration at idle too high or too low								
Cause (component fault)								
G 7	G13	H 5	H23					Air-intake system leaking
F12		H13						Solenoid-operated injection valve defective
●*)		●*)	●*)			K 9		Fuel pressure too low or zero, pressure regulator not operating
		●*)			●*)		●*)	Fuel pressure too high, pressure regulator not operating
				J11		K 7		Fuel delivery too low
	●*)				●*)		●*)	Temperature sensor I (air) or temperature sensor II (coolant) defective
						K 3		Throttle valve not opening fully
				J 7				Poor central ground, loose contacts, faulty plug-in connections
	G13	H 5	H23			K13		Open circuit in wiring harness and plug-in connections
		●*)				●*)		Throttle-valve switch defective
		H17						CO exhaust-gas setting too rich, idle adjustment
		H17	●*)					CO exhaust-gas setting too lean, idle adjustment
F22								Start valve not opening
	G17	H 9			J21		K19	Start valve not closing

B7

Trouble-shooting chart

Volvo 760 Turbo



B8

Trouble-shooting chart

Volvo 760 Turbo



Customer complaints (fault symptoms)

1. Engine fails to start or starts only with great difficulty
 2. Engine starts but then dies
 3. Uneven engine idle, idle speed incorrect
 4. Poor throttle take-up
 5. Engine missing under all operating conditions
 6. Fuel consumption too high
 7. No maximum engine power
 8. CO concentration at idle too high or too low
- Cause (component fault)

G 5	G19	H 9						Thermo-time switch defective
						●*)		Charge-air temperature sensor defective
						K11		Turbocharger or wastegate defective
●*)						K 5		Charge-air pressure switch defective
						K 5		Bypass air valve defective
F14				J13				Time-delay relay for overdrive defective
●*)								Engine-speed sensor defective
●*)								Reference-mark sensor defective
				J15				Check alternator, interference-suppression devices
F12		H 3	H21	J 7	J19	K 3	K17	Check secondary patterns
●*)	●*)	●*)	●*)	J11	●*)	●*)	●*)	Control unit defective

●*) This component has already been tested if you have performed the test with the universal test adapter. Continue testing with the next component in this column.
 However, if you have reached this point by way of a component complaint or the test-specification table, you must test this component with the universal test adapter. The test program for the test adapter starts on Coordinate B 11 and must be performed from beginning to end.

B9

Trouble-shooting chart
Volvo 760 Turbo



B10

Trouble-shooting chart
Volvo 760 Turbo



9. Test with Universal test adapter ETT 018.01
(0 684 101 801) and adapter cable for Motronic

Connect the Motronic test adapter to the Motronic wiring harness (ignition must be off).

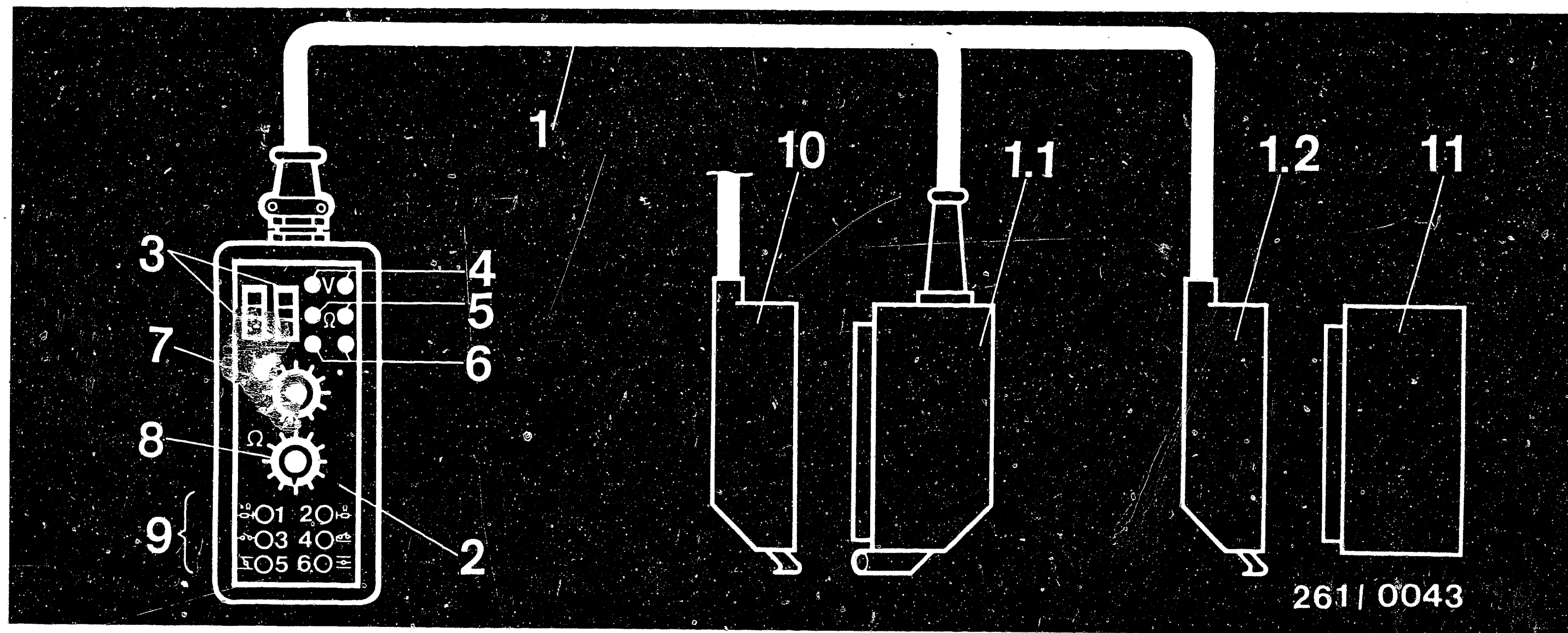
For testing the wiring harness and the connected components, only the Motronic wiring harness must be connected - but not the control unit. Be sure to observe the instructions in the test chart!

A pointer instrument for the voltage and resistance measurements (multimeter) as well as the motortester must be connected to the test adapter in order to make the measurements.

The individual test steps are selected with the program selector switch. The symbols V and Ω show the operator whether voltage or resistance is being measured. Some switch positions are necessary for simulation of operating conditions with engine running. By pressing the pushbuttons it is possible, with the control unit connected and the engine running, to simulate given operating conditions. Thus, for example, with the engine at normal operating temperature it is possible by pressing the push-button T1 to make the control unit "think" that the engine temperature is -20°C . It is then possible to evaluate the reaction of the control unit on the motor-tester.

If necessary, the circuit diagram can be used for trouble-shooting.





Universal test adapter with adapter lead for Motronic

- 1 = Adapter lead
- 1.1 = Connection to wiring harness
- 1.2 = Connection to control unit
- 2 = Universal adapter (Part No.: 0 684 101 801)
- 3 = Test wells (for motortester)
- 4 = Test sockets (for voltage measurement)
- 5 = Test sockets (for resistance measurement)
- 6 = Test sockets (not occupied)
- 7 = Program switch "V"
- 8 = Program switch "Ω"

- 9 = Button panel for simulation of operating conditions
- 10 = Motronic wiring harness
- 11 = Control unit
- Button 1 = NTC II (engine), cold (-20°C)
- Button 2 = NTC II (engine), warm (+80°C)
- Button 3 = Pump energization
- Button 4 = Not occupied
- Button 5 = Throttle-valve idle contact
- Button 6 = Throttle-valve full-load contact

B12

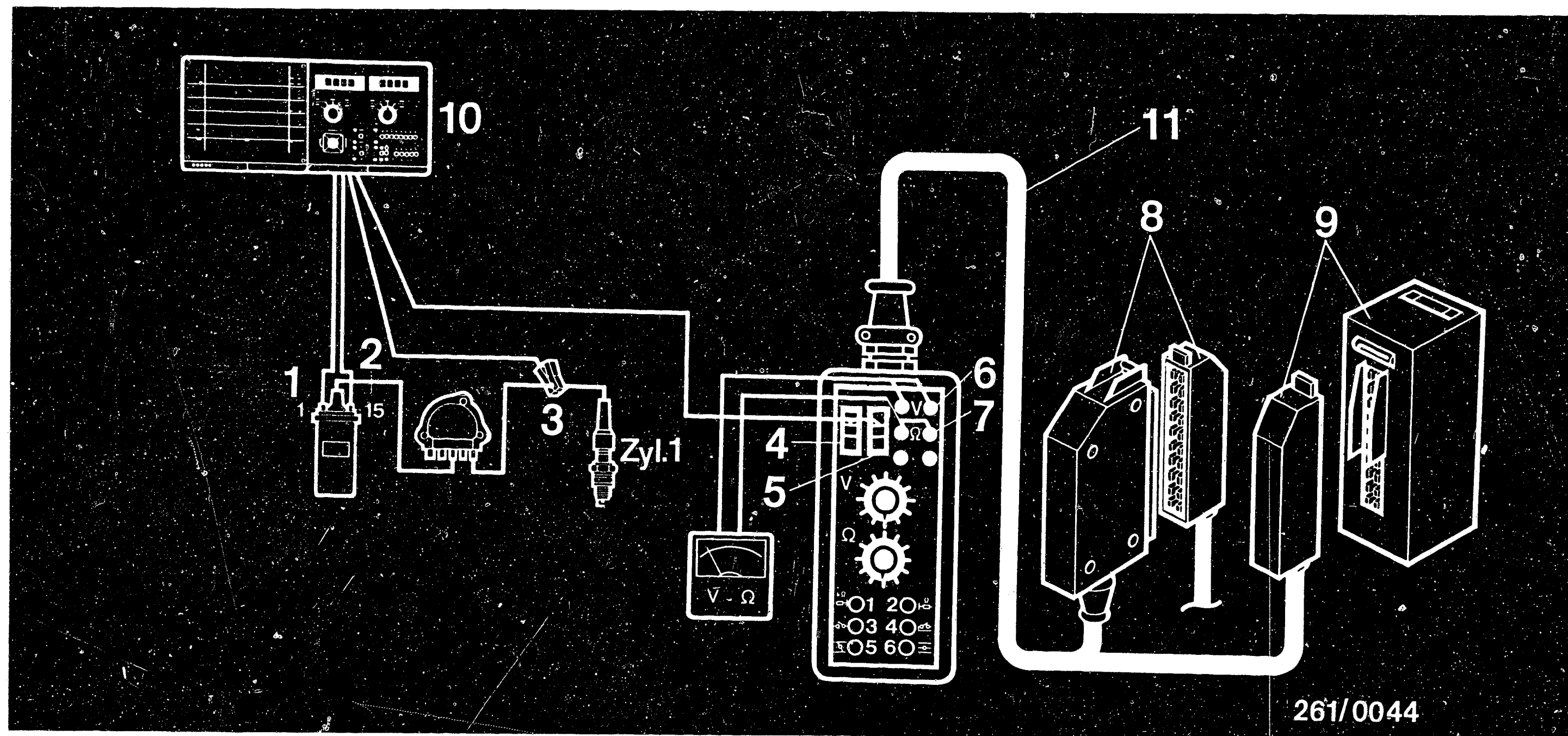
Test with universal test adapter
Volvo 760 Turbo



B13

Test with universal test adapter
Volvo 760 Turbo





9.3 Connection diagram for test adapter

- 1 = Green clip to ignition coil term. 1
- 2 = Yellow clip to ignition coil term. 15
- 3 = Induction-type clamp-on pickup over H.T. •
ignition cable of cylinder 1
- 4 = Red connection socket (test well) for
red terminal of motortester
- 5 = Black connection socket (test well) for
black terminal of motor tester

- 6 = Connection of voltmeter to V sockets
(red = +, black = ground or negative)
- 7 = Connection of ohmmeter to black
Ω sockets (blue)
- 8 = Connection to Motronic wiring harness
- 9 = Connection to Motronic control unit
- 10 = Motortester
- 11 = Adapter cable for Motronic

B14

Test with universal test adapter
Volvo 760 Turbo



B15

Test with universal test adapter
Volvo 760 Turbo



Preparations for test with Universal test adapter

Remove the control unit and connect test test adapter

Installation position of control unit: Behind side panelling in right-hand footwell.

Installation position of the control unit: Under the instrument panelling in front of the steering column.

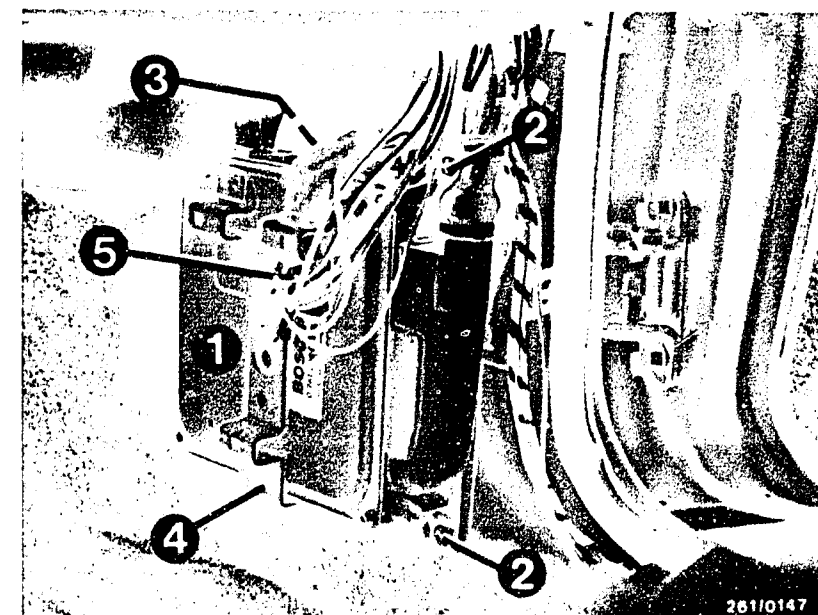
The control unit is fastened by 2 screws and is slipped into the bracket.

Note

In order to rule out any confusion between the control units of the various systems, a mechanical locking device has been introduced. The "locating lug" (pivot point when opening and connecting the control unit) and the corresponding mounting point on the control unit have matching recesses and pins.

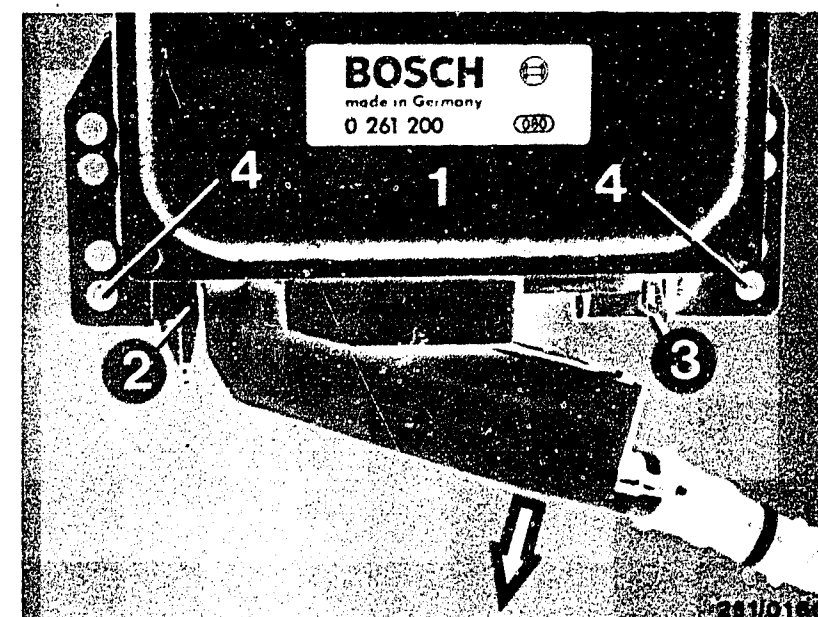
Note:

In the following test steps, the column "operation" has a white border to show which operation has to be changed compared with the previous operation.



- 1 = Control unit
- 2 = Fastening screws
- 3 = Reed relay for air conditioner
- 4 = Bracket
- 5 = Ground terminals

- 1 = Control unit
- 2 = Locating lug
- 3 = Detent
- 4 = Fastening holes



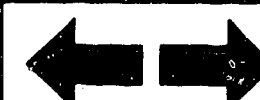
B 16

Test with universal test adapter
Volvo 760 Turbo



B 17

Test with universal test adapter
Volvo 760 Turbo

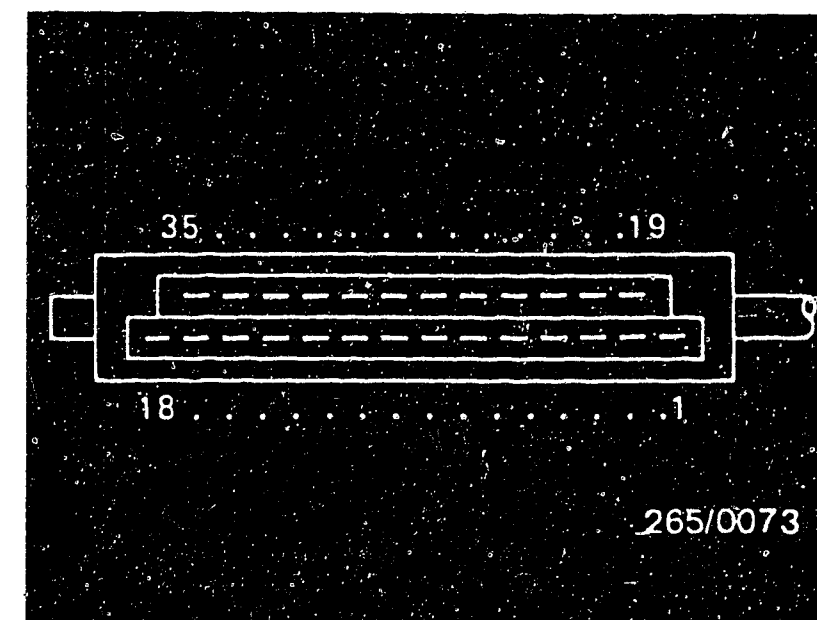


Test step 1: Switch off ignition. Disconnect control unit and pump relay			
Operation		Reading	Testing
Program switch position "V"	↓	Multimeter must indicate <u>greater than 1MΩ.</u> <	

Trouble-shooting:

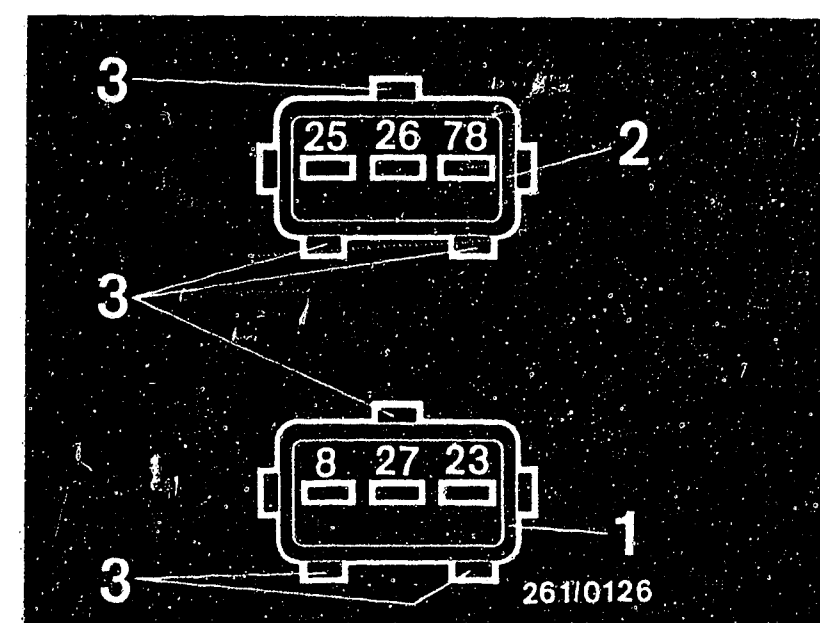
Resistance reading approx. 0 Ω:
Check lead 8 for short circuit to ground.

Resistance reading 0.6...1.6 kΩ:
Check lead 27 for short circuit to ground.



Top view of 35-pin multiple plug

- 1 = Connector for engine-speed sensor
- 2 = Connector for reference-mark sensor with marking
- 3 = Locating lug



B 18

Test with universal test adapter
Volvo 760 Turbo



B 19

Test with universal test adapter
Volvo 760 Turbo

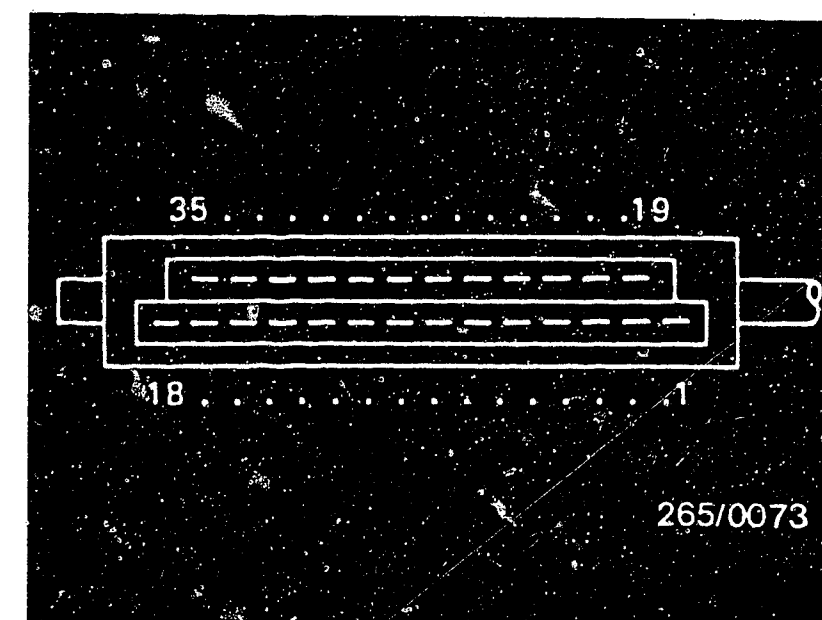


Test step 2			
Operation		Reading	Testing
Program switch position "V"	↓	Multimeter must indicate	<u>Component:</u> Reference-mark sensor
Program switch position "Ω"	2	<u>Greater than 1 M Ω</u>	
<u>Measuring equipment:</u> Multimeter (Ω range)		If reading O.K., continue testing with <u>next test step</u>	<u>Operation:</u> Insulation between Term. 25 and ground
<u>Measuring range:</u> 10 M Ω			<u>Malfunction:</u> Resistance less than 1 M Ω
<u>Connection:</u> Test sockets Ω			
<u>Operation in vehicle:</u> Switch off ignition.			

Trouble-shooting:

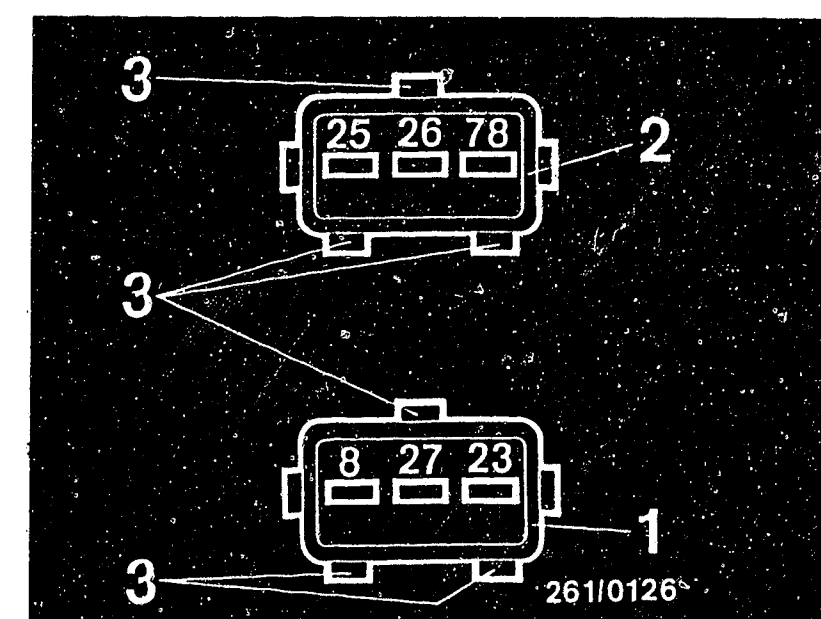
Resistance reading approx. 0 Ω:
Check lead 25 for short circuit to ground.

Resistance reading 0.6...1.6 kΩ:
Check lead 26 for short circuit to ground.



Top view of 35-pin multiple plug

- 1 = Connector for engine-speed sensor
- 2 = Connector for reference-mark sensor with marking
- 3 = Locating lug



B 20


Test with universal test adapter
Volvo 760 Turbo



B 21

Test with universal test adapter
Volvo 760 Turbo



Test step 3		
Operation		Reading
Program switch position "V"		Multimeter must indicate 0.6...1.6 kΩ
Program switch position "Ω"	3	
Measuring equipment: Multimeter (Ω range)		
Measuring range: 0 to 10 kΩ		
Connection: Test sockets	Ω	
Operation in vehicle: Switch off ignition		If reading O.K., continue testing with next test step

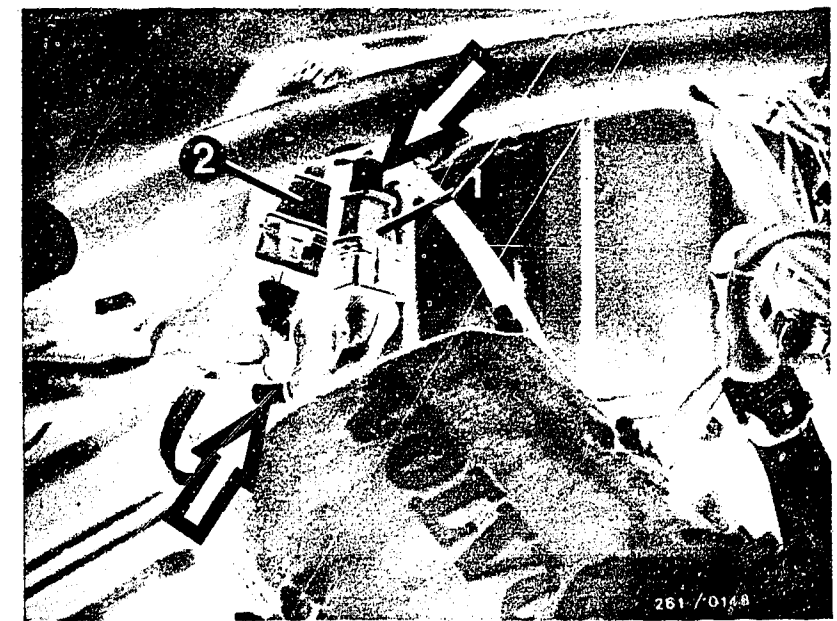
Testing
Component: Engine-speed sensor
Operation: Winding resistance between Term. 8 and Term. 27
Malfunction: Resistance outside tolerance

Trouble-shooting:

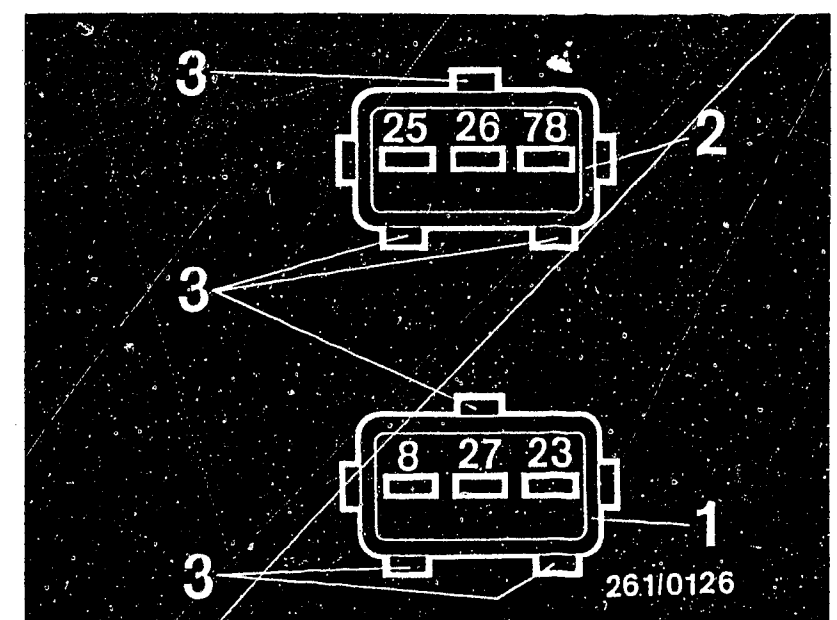
- Repeat measurement directly at sensor plug.
- Check plug-in connection: Corrosion, loose contact (spring contacts must not allow themselves to be pushed back)
- Check leads from engine-speed sensor Term. 8 and Term. 27 to multiple plug Term. 8 and Term. 27.
- Replace sensor.

To replace the sensors, undo the plug-in connection and unscrew the hexagon-socket-head cap screw on the sensor. Remove dirt deposits on the sensor. If necessary, apply two screwdrivers to the recesses to left and right of the sensor and raise the sensor. Caution! Do not loosen the mounting.

Continued on C1/C2



- Plug connectors of
 1 = Reference-mark sensor
 2 = Engine-speed sensor
 Arrows = marking
 Top view of connectors to the sensors
 1 = Connector for engine-speed sensor
 2 = Connector for reference-mark sensor with marking
 3 = Locating lug



B22

Test with universal test adapter
Volvo 760 Turbo



B23

Test with universal test adapter
Volvo 760 Turbo



Trouble-shooting - test step 3 (continued)

Before installing the sensors, make sure that no metallic parts are sticking to the sensor (sensors contain permanent magnets). Grease sensors with "Molykote Longterm 2".

Do not mix up sensors when installing.

(The engine-speed sensor is nearest the engine block).

Note marking:

- Leads to reference-mark sensor connector are wound round with adhesive tape.

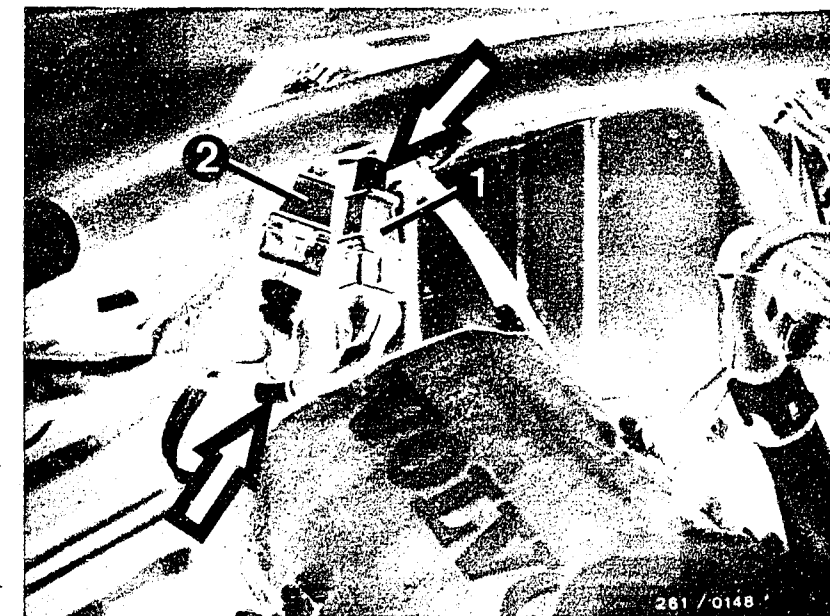
The sensors are plugged into the bore as far as they will go and are secured.

Do not use force when inserting.

When mounting, make sure that the connectors are connected the right way round.

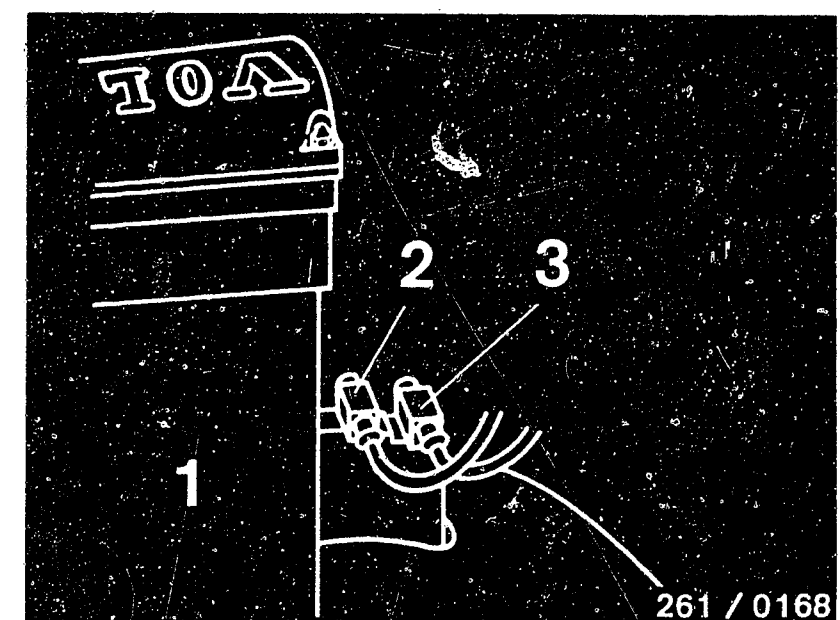
Ensure proper seating and latching of spring contacts in connector.

Spring contacts must not allow themselves to be pushed back.



Connectors of
1 = Reference-mark sensor
2 = Engine-speed sensor
Arrows = Marking

1 = Engine block
2 = Engine-speed sensor
3 = Reference-mark sensor



C1

Test with universal test adapter

Volvo 760 Turbo




C2

Test with universal test adapter

Volvo 760 Turbo



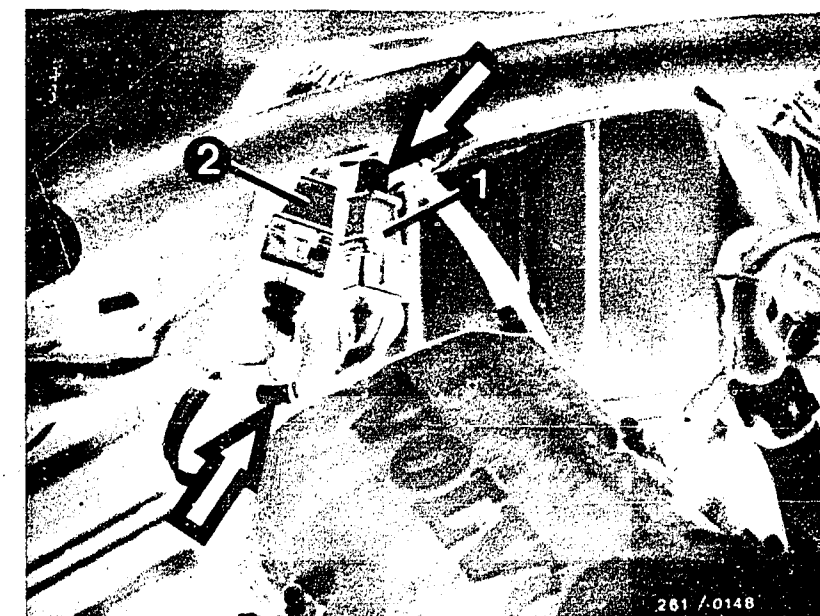
Test step 4			
Operation		Reading	Testing
Program switch position "V"		Multimeter must indicate <u>0.6...1.6 kΩ</u> If reading O.K., continue testing with next test step	<u>Component:</u> Reference-mark sensor
Program switch position "Ω"			
Measuring equipment: Multimeter (Ω range)			<u>Operation:</u> Winding resistance between Term. 25 and Term. 26
Measuring range: 0 to 10 kΩ			
Connection:			
Test sockets	Ω		
Operation in vehicle: Switch off ignition			<u>Malfunction:</u> Resistance outside tolerance.

Trouble-shooting:

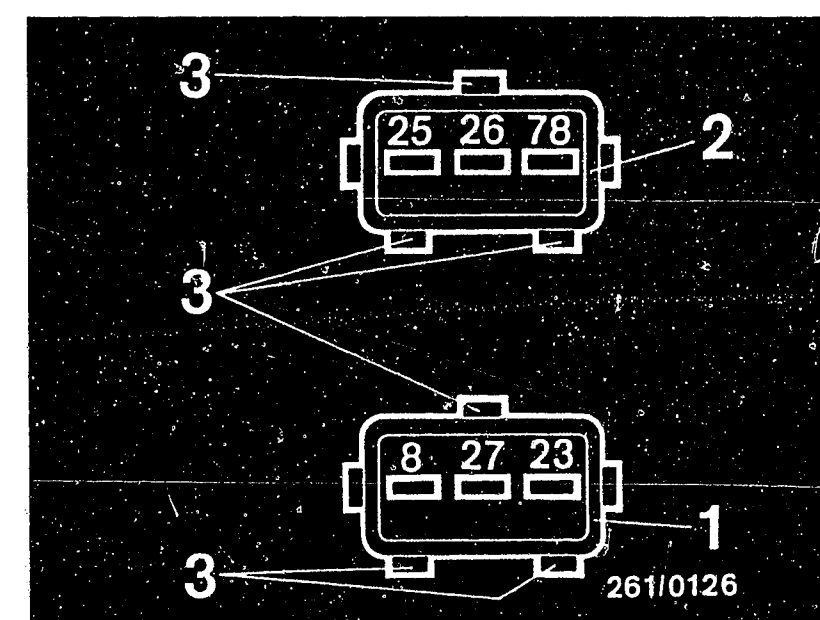
- Repeat measurement directly at sensor plug.
- Check plug-in connection for corrosion, loose contact (spring contacts must not allow themselves to be pushed back)
- Check leads from reference-mark sensor Term. 25 and Term. 26 to multiple plug Term. 25 and Term. 26.
- Replace sensor.

To replace the sensors, unscrew the hexagon-socket-head cap screw on the sensor. Remove dirt deposits from sensor. If necessary, apply two screwdrivers to the recesses to left and right of the sensor and raise sensor.

Continued on C 5/C 6



Plug connectors of
 1 = Reference-mark sensor
 2 = Engine-speed sensor
 Arrows = marking
 Top view of connectors to the sensors
 1 = Connector for engine-speed sensor
 2 = Connector for reference-mark sensor with marking
 3 = Locating lug



C3

Test with universal test adapter
Volvo 760 Turbo



C4

Test with universal test adapter
Volvo 760 Turbo



Trouble-shooting - Test step 4 (continued)

Before installing the sensors, make sure that no metallic parts are sticking to the sensor (sensors contain permanent magnets). Grease sensors with Molykote Longterm 2.

Do not mix up the sensors when installing!

Pay attention to markings:

- Leads to reference-mark sensor connector are wound with adhesive tape.

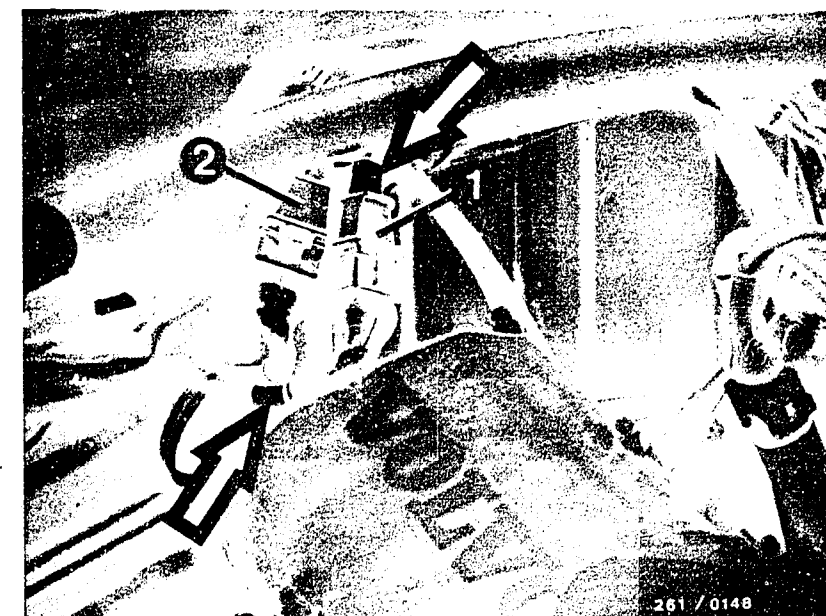
The sensors are plugged into the bore as far as they will go and are secured.

Do not use force when inserting.

When mounting, make sure that the connectors are connected the right way round.

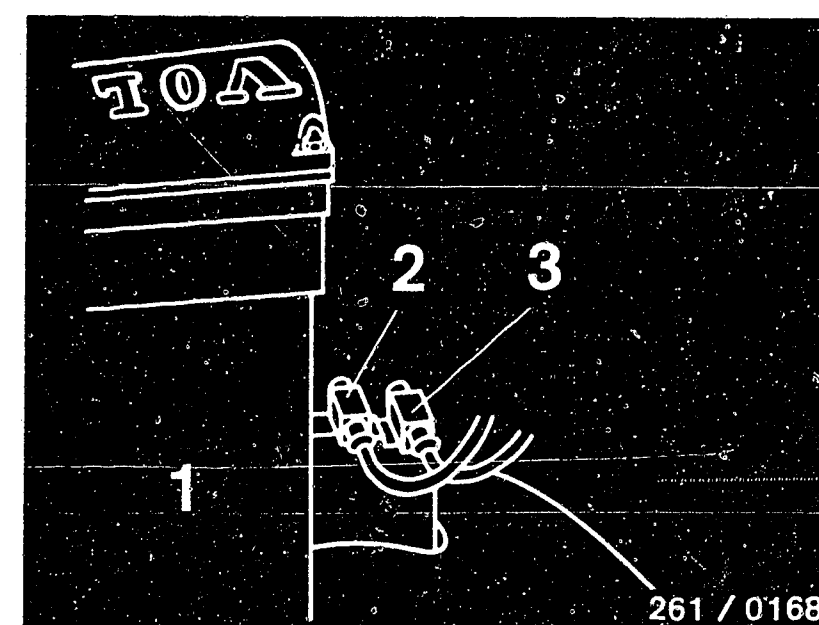
Ensure proper seating and latching of spring contacts in connector.

Spring contacts must not allow themselves to be pushed back.



Connectors of
1 = Reference-mark sensor
2 = Engine-speed sensor
Arrows = Marking

1 = Engine block
2 = Engine-speed sensor
3 = Reference mark sensor



C5

Test with universal test adapter
Volvo 760 Turbo

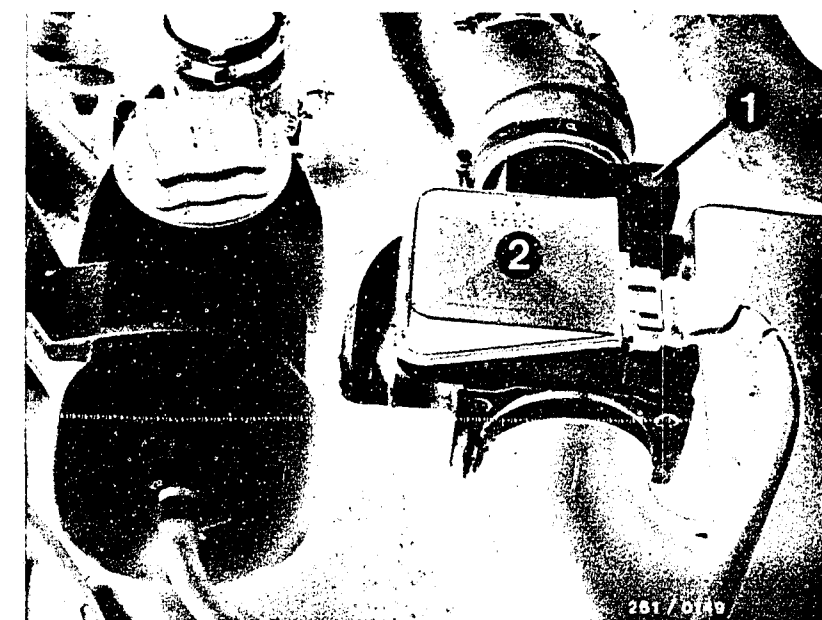


C6

Test with universal test adapter
Volvo 760 Turbo



Test step 5			
Operation		Reading	Testing
Program switch position "V"	↓	Reading is temperature -dependent, i.e. note engine temperature. At ambient temper- ature (+15°...+30°C): <u>1.45...3.3 kΩ</u> With engine at normal operating temperature (approx. + 80° C): <u>280...360Ω</u> If reading O.K., continue testing with next test step.	<u>Component:</u> Engine temperature sensor (NTC II)
Program switch position "Ω"	5		<u>Operation:</u> Resistance between Term. 13 and ground
Measuring equipment: Multimeter (Ω range)			<u>Malfunction:</u> Resistance outside tolerance. Note temperature.
Measuring range:			
0 to 10 kΩ			
Connection:			
Test sockets	Ω		
Operation in vehicle:			
Switch off ignition			



1 = Idle-mixture-adjusting screw
2 = Air-flow sensor with NTC I

Trouble-shooting:

- Remove plug from temperature sensor and measure resistance directly. If necessary, replace temperature sensor.
- Check leads from temperature sensor to multiple plug Term. 13 and to ground terminal.
- Eliminate contact resistances at the plug-in connections.
Spring contacts must not allow themselves to be pushed back.

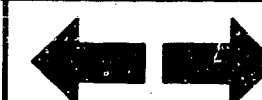
C7

Test with universal test adapter
Volvo 760 Turbo

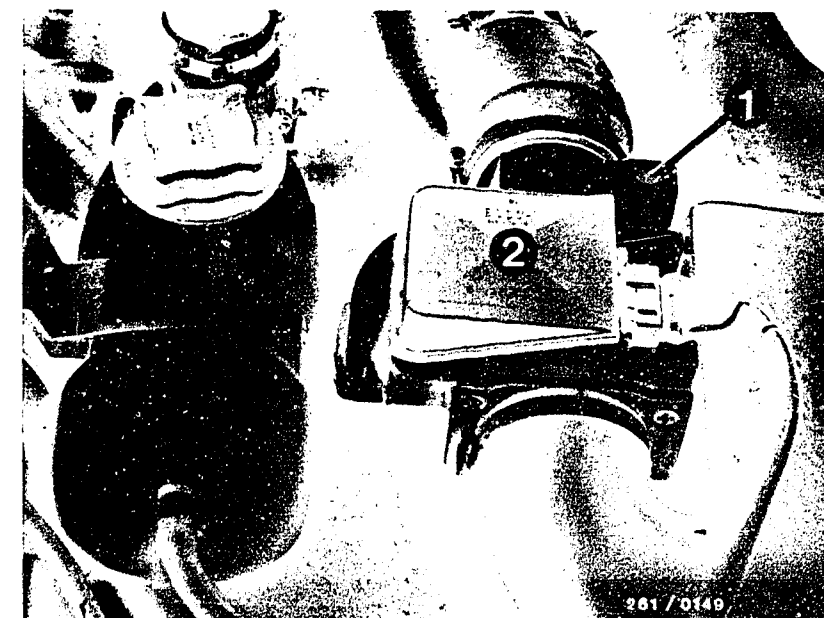


C8

Test with universal test adapter
Volvo 760 Turbo

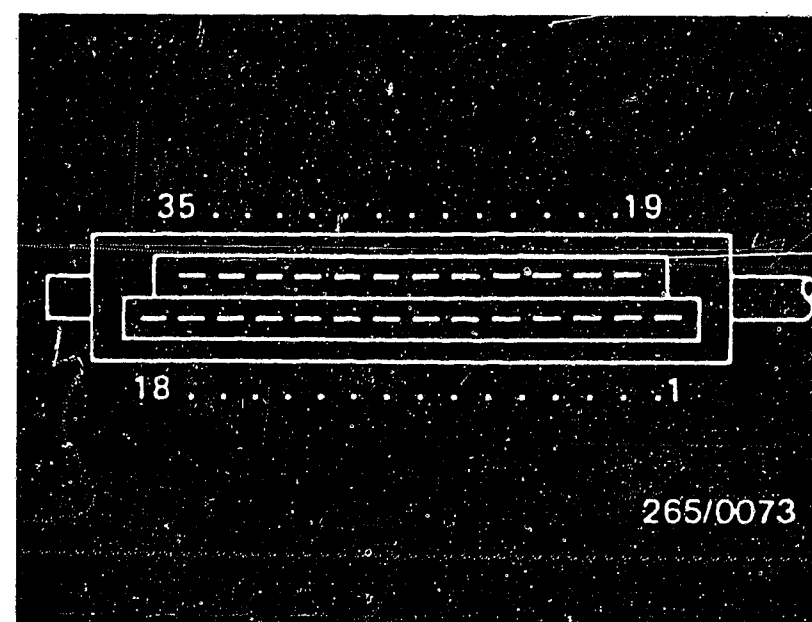


Test step 6			
Operation		Reading	Testing
Program switch position "V"	↓	Reading is temperature -dependent, i.e. note engine temperature. At ambient temper- ature (+15°...+30° C): <u>1.45...3.3 kΩ</u> With engine at normal operating temperature (approx. + 80° C): <u>280...360Ω</u> If reading O.K., continue testing with <u>next test step</u>	<u>Component:</u> Air temperature sensor (NTC I)
Program switch position "Ω"	6		
Measuring equipment: Multimeter (Ω range)			
Measuring range: 0 to 10 kΩ			
Connection: Test sockets	Ω		<u>Operation:</u> Resistance between Term. 22 and ground
Operation in vehicle: Switch off ignition			<u>Malfunction:</u> Resistance outside tolerance. Note temperature.



1 = Idle-mixture-adjusting screw
2 = Air-flow sensor with NTC I

Top view of 35-pin multiple plug



Trouble-shooting:

- Remove plug from air-flow sensor and measure resistance directly at Term. 22 and Term. 6. If reading outside tolerance, replace air-flow sensor.
- Check leads from air-flow sensor Term. 6 and Term. 22 to multiple plug Term. 6 and Term. 22
- Eliminate contact resistances in the plug-in connections.
Spring contacts must not allow themselves to be pushed back.

C9

Test with universal test adapter
Volvo 760 Turbo



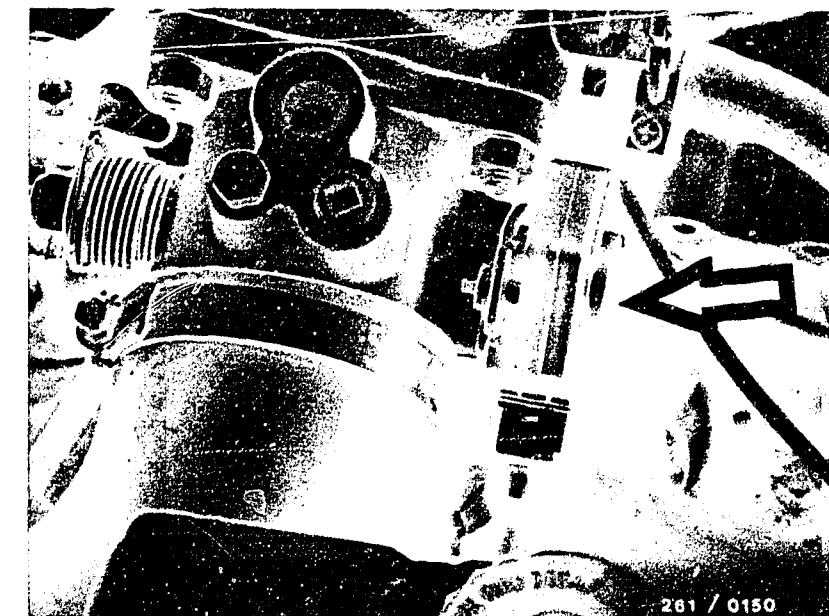
C10

Test with universal test adapter
Volvo 760 Turbo



Test steps 7 and 8 deleted!

Test step 9		Reading	Testing
Operation			
Program switch position "V"	↓	Accelerator in rest position: Less than 10 Ω	Component: Throttle-valve switch
Program switch position "Ω"	9	(Measured value is influenced by protective resistor in adapter).	Operation:
Measuring equipment: Multimeter (Ω range)		Accelerator depressed	Idle contact between terminal 2 and ground
Measuring range: 0 to 10 k Ω		(Part-load range): $\infty \Omega$ 1)	Malfunction:
Connection: Test sockets	Ω	If reading O.K., continue testing with next test step.	Resistance in rest position greater than 10 Ω or less than $\infty \Omega$.
Operation in vehicle: Switch off ignition			



Arrow = Throttle-valve switch

Trouble-shooting:

1) Adjust throttle-valve switch:

Loosen the fastening screws. Turn the operating lever to full throttle and slowly return to the idle stop. Reading less than 15 Ω .

Turn the switch in a clockwise direction until the inner stop can be felt. Tighten screws.

Continued on C 13/C 14

C11

Test with universal test adapter
Volvo 760 Turbo



C12

Test with universal test adapter
Volvo 760 Turbo



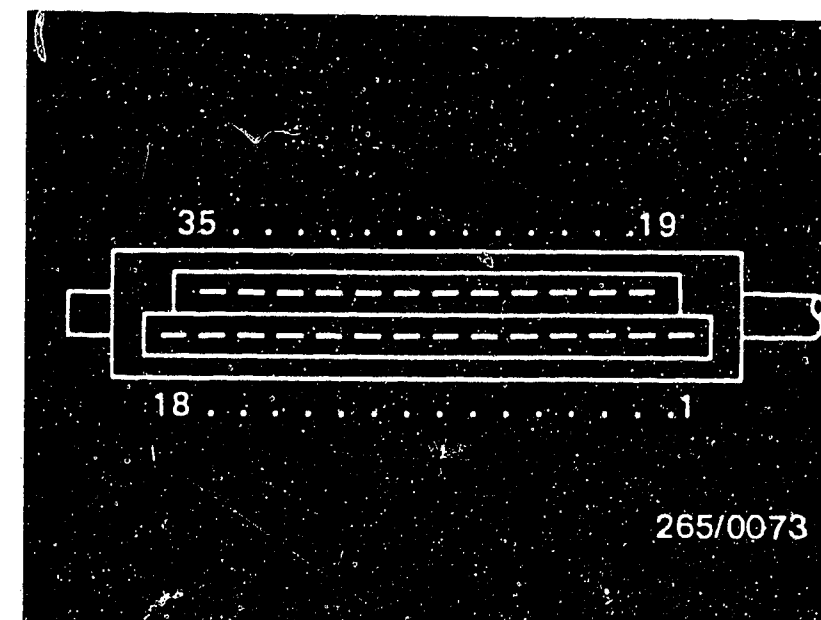
Trouble-shooting - test step 9 (continued)

Check: Slowly open throttle in full-load direction. Reading must change to $\infty \Omega$ shortly after the throttle is opened.

If no adjustment is possible:

Test BOSCH throttle-valve switch as well as leads from throttle-valve switch term. 2 and term. 18 to multiple plug term. 2 and ground terminal respectively. Eliminate contact resistances.

Spring contacts must not allow themselves to be pushed back.



Top view of 35-pin multiple plug

C13

Test with universal test adapter
Volvo 760 Turbo

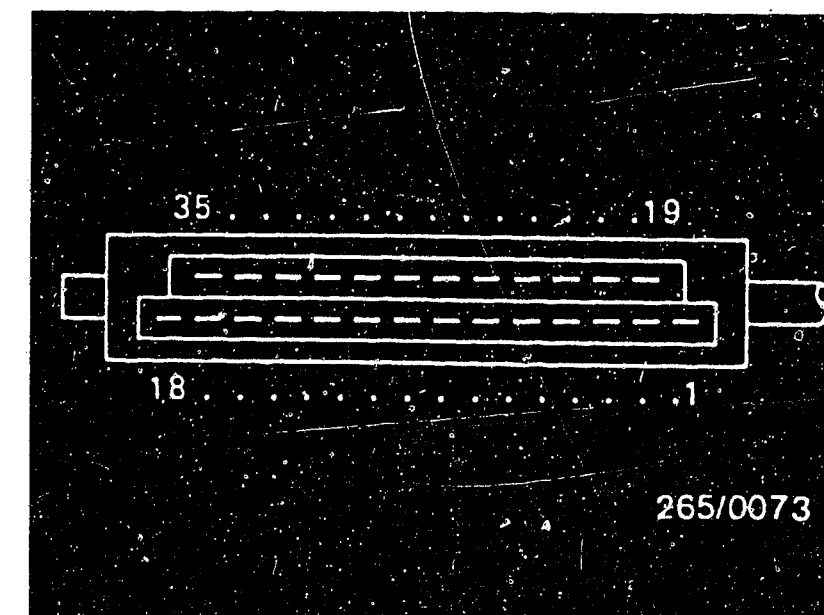


C14

Test with universal test adapter
Volvo 760 Turbo

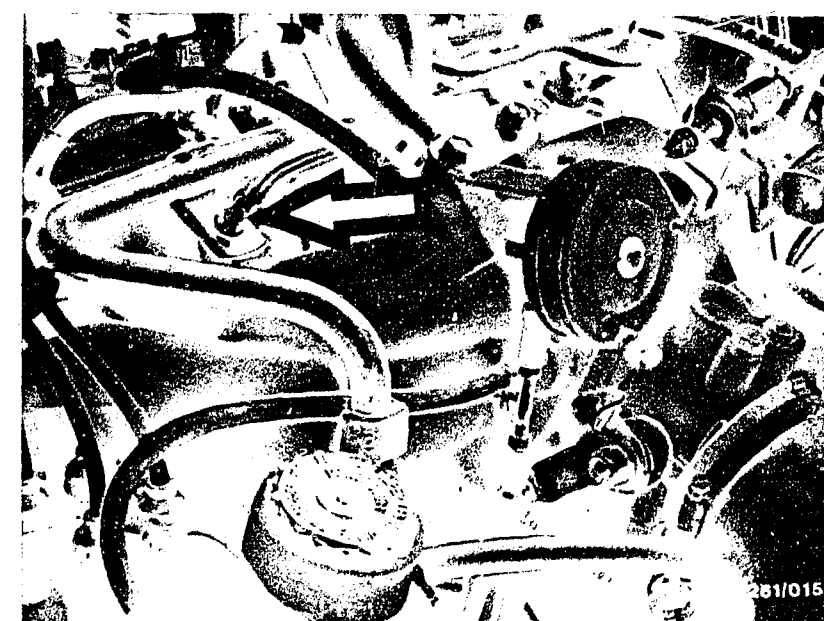


Test step 11 (test step 10 deleted)		
Operation		Reading
Program switch position "V"	↓	Multimeter must indicate Less than 10 Ω .
Program switch position "Ω"	11	(Measured value is influenced by protective resistor in adapter)
Measuring equipment: Multimeter (Ω range)		
Measuring range:		
0 to 10 k Ω		
Connection:		
Test sockets	Ω	
Operation in vehicle:		
Switch off ignition		If reading O.K., continue testing with next test step
		Testing
		Component: Ground lead
		Operation: Contact resistance between Term. 16 and ground
		Malfunction: Resistance greater than 10 Ω



Top view of 35-pin multiple plug

Arrow = Ground terminal



Trouble-shooting:

For testing, remove wiring-harness plug from test adapter and, if necessary, use circuit diagram.

Test the following leads for continuity using ohmmeter (set value approx. 0 Ω):

- From multiple plug term. 5 to electronics ground terminal.
- From multiple plug term. 16 to output stage ground terminal.

Eliminate contact resistances at connection points.

Spring contacts must not allow themselves to be pushed back.

C15

Test with universal test adapter
Volvo 760 Turbo

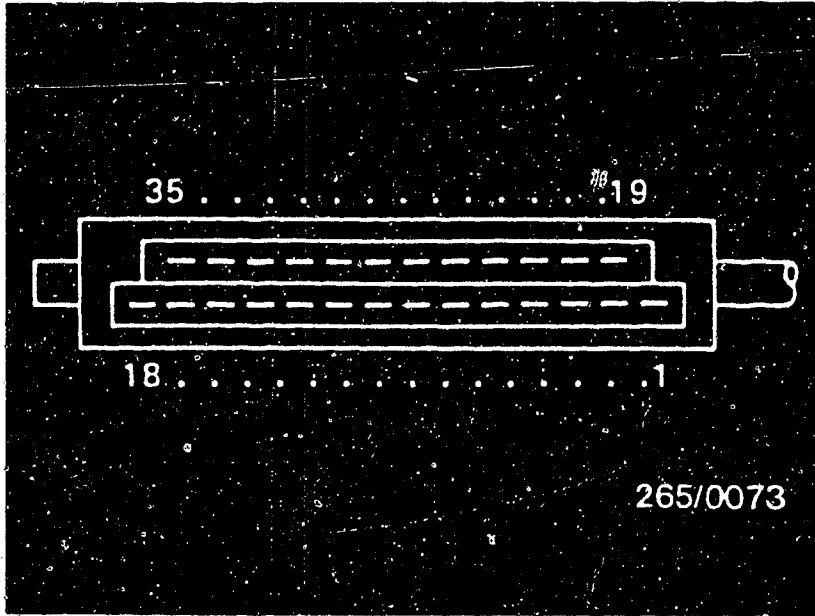


C16

Test with universal test adapter
Volvo 760 Turbo

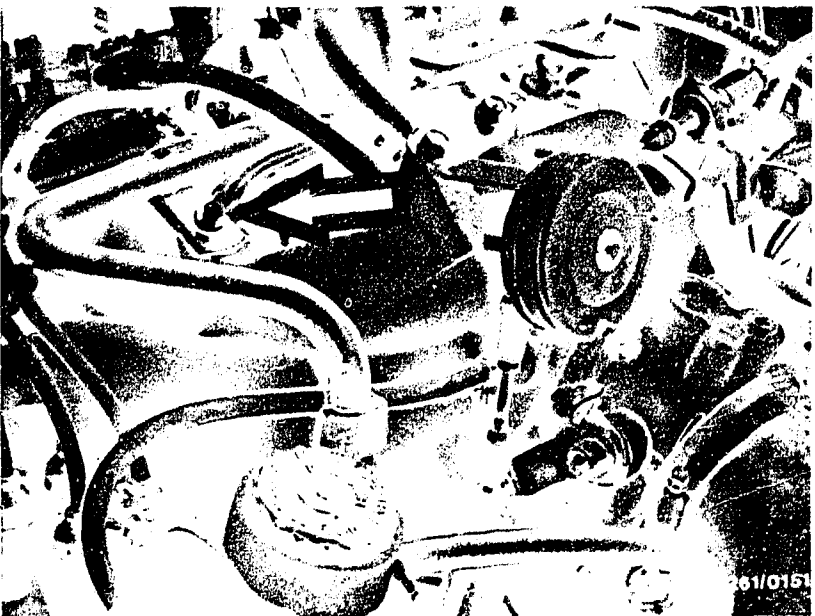



Test step 12			
Operation		Reading	Testing
Program switch position "V"		Multimeter must indicate Less than 10 Ω (Measured value is influenced by protective resistor in adapter) If reading O.K., continue testing with next test step	Component: Ground lead
Program switch position " Ω "			
12			
Measuring equipment: Multimeter (Ω range)			Operation: Contact resistance between Term. 17 and ground
Measuring range: 0 to 10 k Ω			
Connection:			Malfunction: Resistance greater than 10 Ω
Test sockets	Ω		
Operation in vehicle: Switch off ignition			



Top view of 35-pin multiple plug

Arrow = Ground terminal



Test step 13			
Operation		Reading	Testing
<u>Program switch position</u> "V"		Multimeter must indicate	<u>Component:</u> Ground lead
<u>Program switch position</u> "Ω"	13	<u>Less than 10 Ω</u> (Measured value is influenced by protective resistor in adapter)	<u>Operation:</u> Contact resistance between Term. 19 and ground
<u>Measuring equipment:</u> Multimeter (Ω range)		<u>If reading O.K., continue testing with next test step</u>	
<u>Measuring range:</u> 0 to 10 kΩ			
<u>Connection:</u> Test sockets	Ω		<u>Malfunction:</u> Resistance greater than 10 Ω
<u>Operation in vehicle</u> Switch off ignition			

Trouble-shooting

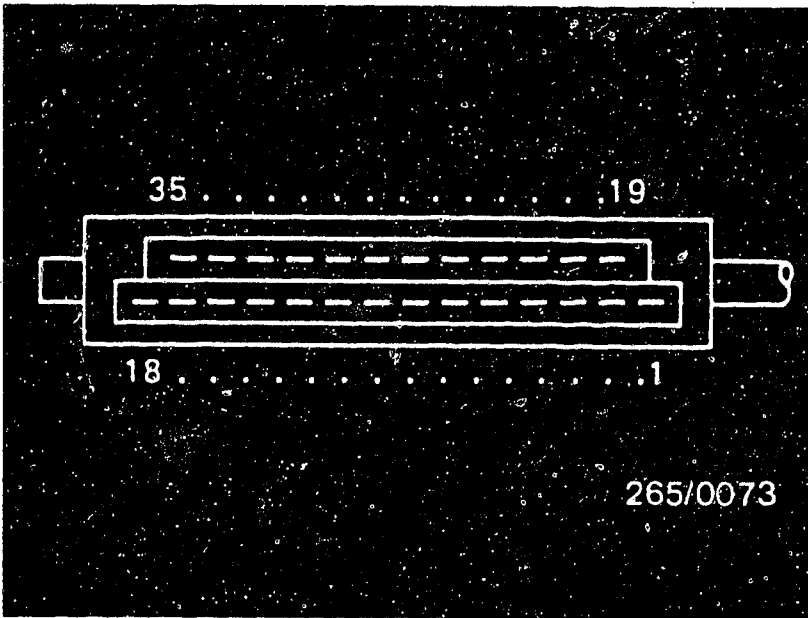
For testing, remove wiring-harness plug from adapter and, if necessary, use circuit diagram.

Test the following leads for continuity using ohmmeter (set value approx. 0 Ω)

- From multiple plug term. 19 to electronics ground terminal.
- From multiple plug term. 5 to output stage ground terminal.

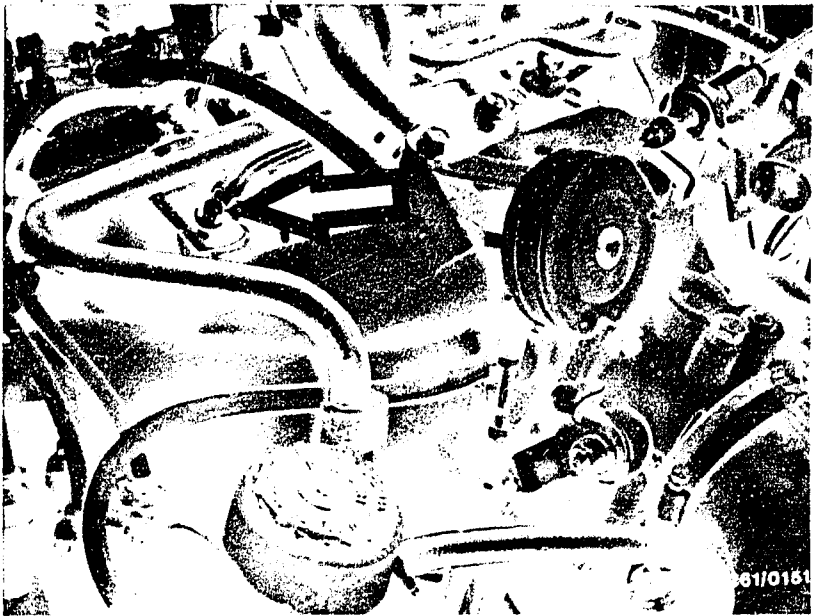
Eliminate contact resistances at connection points.

Spring contacts must not allow themselves to be pushed back.

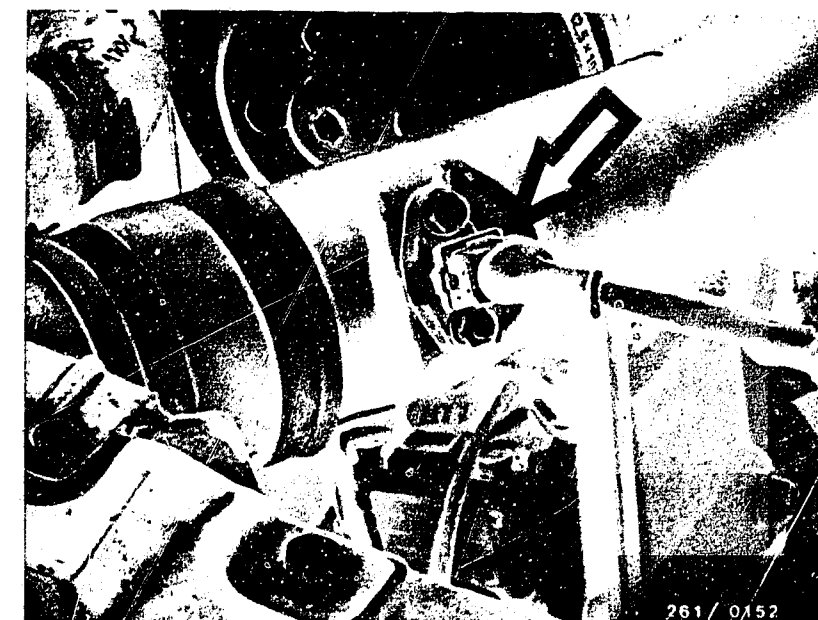


Top view of 35-pin multiple plug

Arrow = Ground terminal



TEST STEP 14:			
Operation:		Reading:	Testing:
<u>Program switch "V"</u> at position:	↓	Measured value is dependent on temperature, i.e. note temperature. At ambient temperature (+15° ... 30°C): <u>900 ... 1100 Ω</u> at +80°C: <u>1230 ... 1370 Ω</u> If reading O.K., continue testing with next test step.	<u>Component:</u> Charge-air temperature sensor
<u>Program switch "Ω"</u> at position:	14		<u>Operation:</u> Resistance between term. 30 and term. 5 (ground)
<u>Measuring equipment:</u> Multimeter (Ω range)			
<u>Measuring range:</u> 0 to 10 kΩ			
<u>Connection:</u> Test sockets	Ω		<u>Malfunction:</u> Resistance outside tolerance. Note temperature.
<u>Operation in vehicle:</u> Switch off ignition			

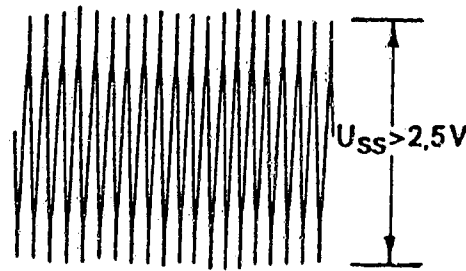


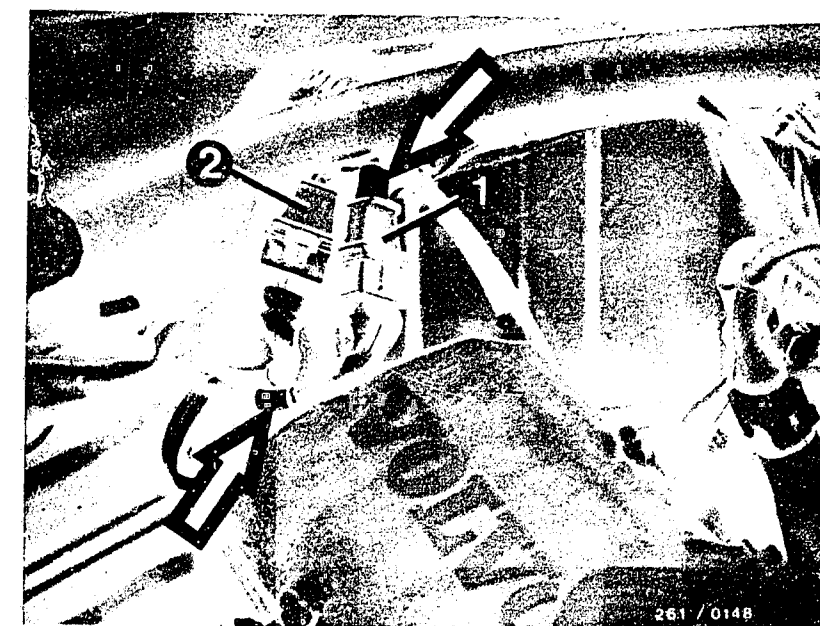
Arrow = Charge-air temperature sensor

Trouble-shooting:

- Disconnect connector from temperature sensor and measure resistance directly. If necessary, replace temperature sensor.
- Check leads from temperature sensor to multiple plug term. 30 and term. 23.
- Eliminate contact resistances at the plug-in connections. Spring contacts must not allow themselves to be pushed back.

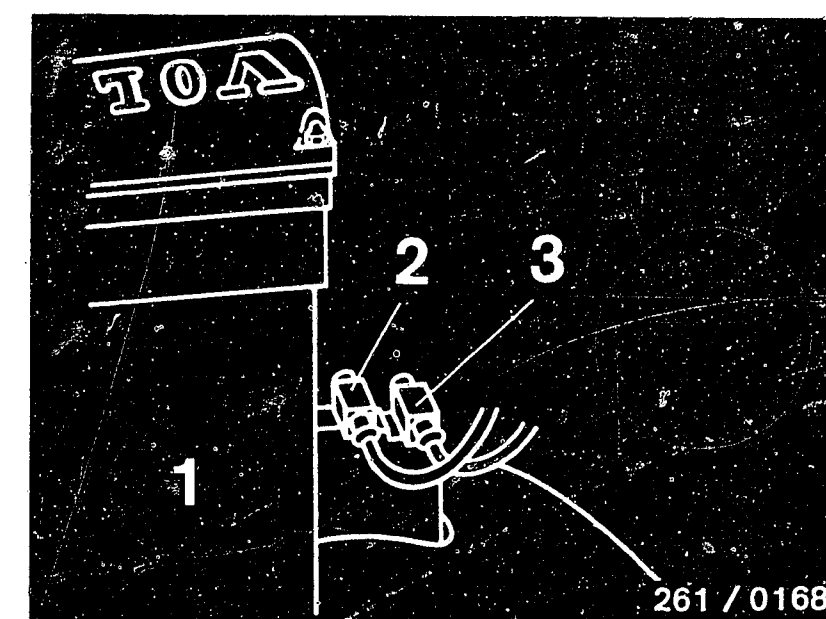


Test step 16 (test step 15 deleted)			
Operation		Reading	Testing
<u>Program switch position</u> "V"	1		<u>Component:</u> Engine-speed sensor
<u>Program switch position</u> "Ω"	15		
<u>Measuring equipment:</u> Motortester, oscilloscope		Lever to left-hand stop (calibrated voltage range)	<u>Operation:</u> Amplitude (signal) at terminals 8 and 27
<u>Measuring range:</u> Special input			
<u>Connection:</u> Test wells; red clip to red well, black clip to black well		If reading O.K., continue testing with <u>next test step.</u>	<u>Malfunction:</u> No signal or signal too small. Incorrect signal
<u>Operation in vehicle:</u> Shift gear to neutral and operate starting motor			



Connectors of
1 = Reference-mark sensor
2 = Engine-speed sensor
Arrows = Marking

1 = Engine block
2 = Engine-speed sensor
3 = Reference-mark sensor



Trouble-shooting:

No signal or signal too small:

- Cranking speed below 200 min^{-1} ; charge battery.
- The air gap (nominal dimension 0.8 mm) can be measured directly with a feeler gauge only with the engine removed. Slide feeler gauge 0.8 mm between ring gear and engine-speed sensor.
The sensors are mounted in a mounting block and are not adjustable.

Continued on D3/D4

D1

Test with universal test adapter
Volvo 760 Turbo



D2

Test with universal test adapter
Volvo 760 Turbo



Trouble-shooting - test step 16 (continued)

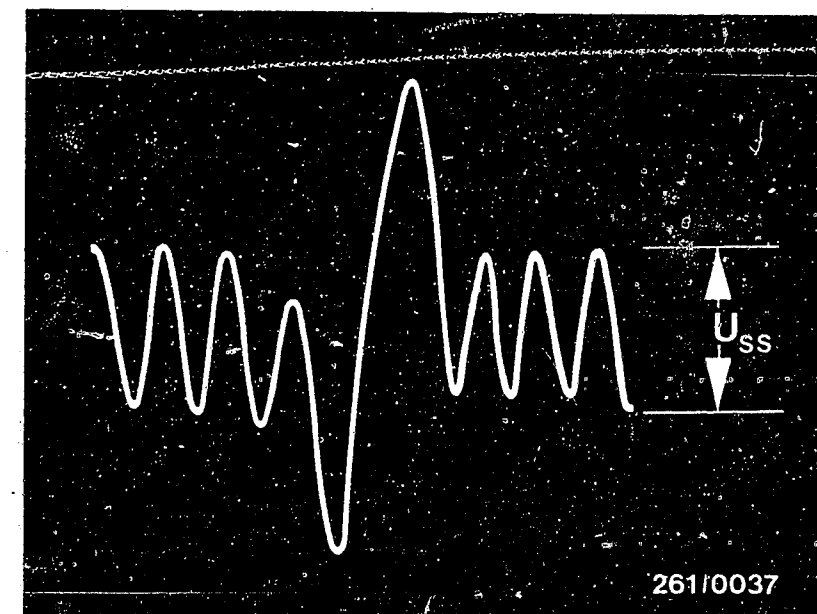
Test the air gap with the engine installed as follows:

With the engine-speed sensor removed, measure the length of the sensor with a depth gauge. Make a note of the measurement. Using depth gauge, measure depth of mounting bore as far as top of tooth. Do not measure into tooth gap.

The difference between both dimensions (bore depth minus sensor length) may be max. 0.8 mm.

- If signal incorrect (greatly extended in the diagram):
Heavily damaged tooth on starting-motor ring gear. Replace ring gear.
- Replace engine-speed sensor:
Unscrew hexagon-socket-head cap screw on sensor. Remove dirt deposits from sensor. If necessary, apply two screwdrivers to the recesses to left and right of the sensor and raise sensor.

Continued on D5/D6



261/0037

D3

Test with universal test adapter
Volvo 760 Turbo



D4

Test with universal test adapter
Volvo 760 Turbo



TEST STEP 16 (continued)

Before installing the sensors, make sure that no metallic parts are sticking to the sensor (sensors contain permanent magnets). Grease sensors with "Molykote Longterm 2".

Do not mix up sensors when installing.

(The engine-speed sensor is nearest the engine block).

Note marking:

- Leads to reference-mark sensor connector are wound round with adhesive tape.

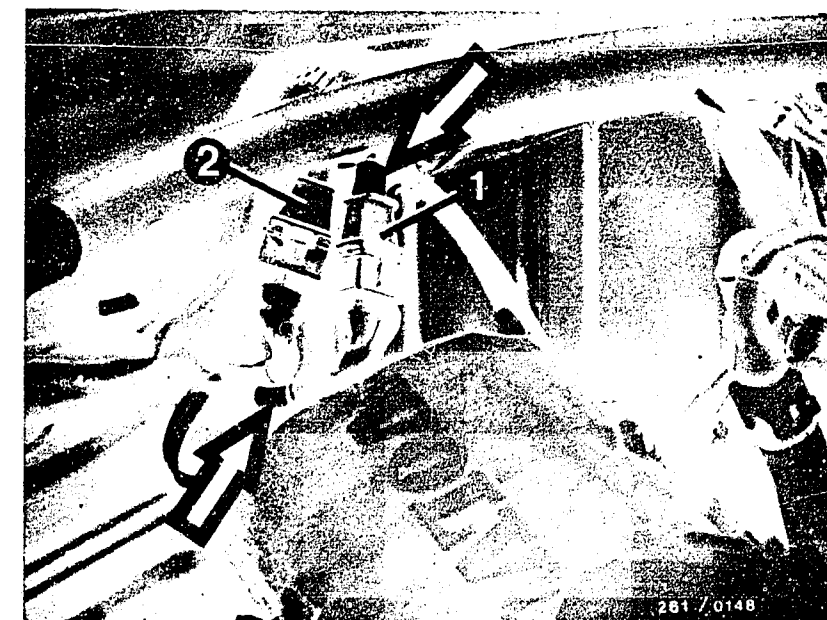
The sensors are plugged into the bore as far as they will go and are secured.

Do not use force when inserting.

When mounting, make sure that the connectors are connected the right way round.

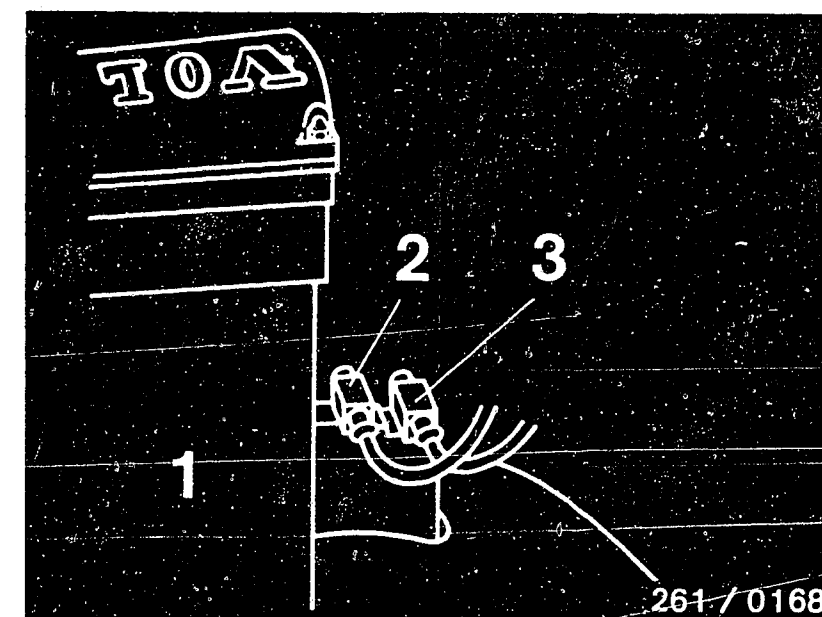
Ensure proper seating and latching of spring contacts in connector.

Spring contacts must not allow themselves to be pushed back.



Connectors of
1 = Reference-mark sensor
2 = Engine-speed sensor
Arrows = Marking

1 = Engine block
2 = Engine-speed sensor
3 = Reference-mark sensor



D5

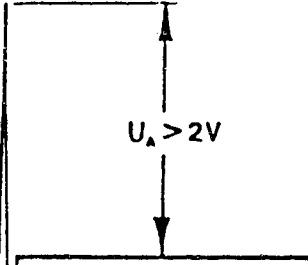
Test with universal test adapter
Volvo 760 Turbo

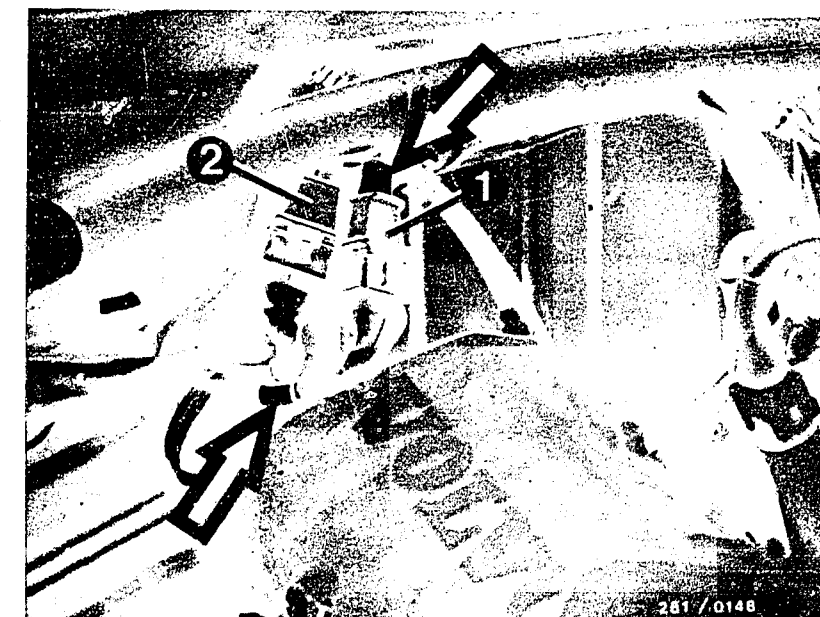


D6

Test with universal test adapter
Volvo 760 Turbo

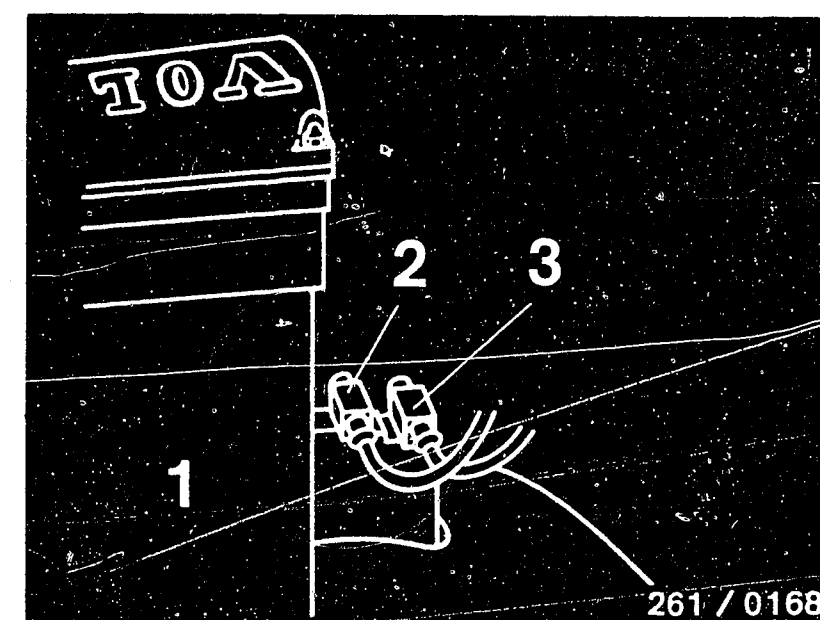


Test step 17			
Operation		Reading	Testing
Program switch position "V"			<u>Component:</u> Reference-mark sensor
	2		
Program switch position "Ω"			
	15		
<u>Measuring equipment:</u> Motortester, oscilloscope		<div>Lever to left-hand stop (calibrated voltage range)</div> <div>If reading O.K., continue testing with next test step.</div>	<div><u>Operation:</u> Amplitude (signal) at terminals 25 and 26</div> <div><u>Malfunction:</u> No signal or signal too small. Incorrect signal.</div>
<u>Measuring range:</u> Special input			
<u>Connection:</u> Test wells; red clip to red well, black clip to black well			
<u>Operation in vehicle:</u> Shift gear to neutral and operate starting motor			



Connectors of
1 = Reference-mark sensor
2 = Engine-speed sensor
Arrows = Marking

1 = Engine block
2 = Engine-speed sensor
3 = Reference-mark sensor



Trouble-shooting:

No signal or signal too small:

- Cranking speed below 200 min^{-1} ; charge battery.
 - The air gap (nominal dimension 0.8 mm) can be measured directly with a feeler gauge only with the engine removed. Slide feeler gauge 0.8 mm between ring gear and engine-speed sensor.
- The sensors are mounted in a mounting block and are not adjustable.

Continued on D 9/D 10

D7

Test with universal test adapter

Volvo 760 Turbo



D8

Test with universal test adapter

Volvo 760 Turbo



Trouble-shooting - test step 17 (continued)

- Replacing the reference-mark sensor:
Unscrew hexagon-socket-head cap screw on sensor. Remove dirt deposits on sensor.
If necessary, apply two screwdrivers to the recesses to left and right of the sensor and raise sensor.

Before installing the sensors, make sure that no metallic parts are sticking to the sensor (sensors contain permanent magnets): Grease sensors with "Molykote Longterm 2".

Do not mix up sensors when installing.

(The engine-speed sensor is nearest the engine block).

Note marking:

- Leads to reference-mark sensor connector are wound round with adhesive tape.

The sensors are plugged into the bore as far as they will go and are secured.

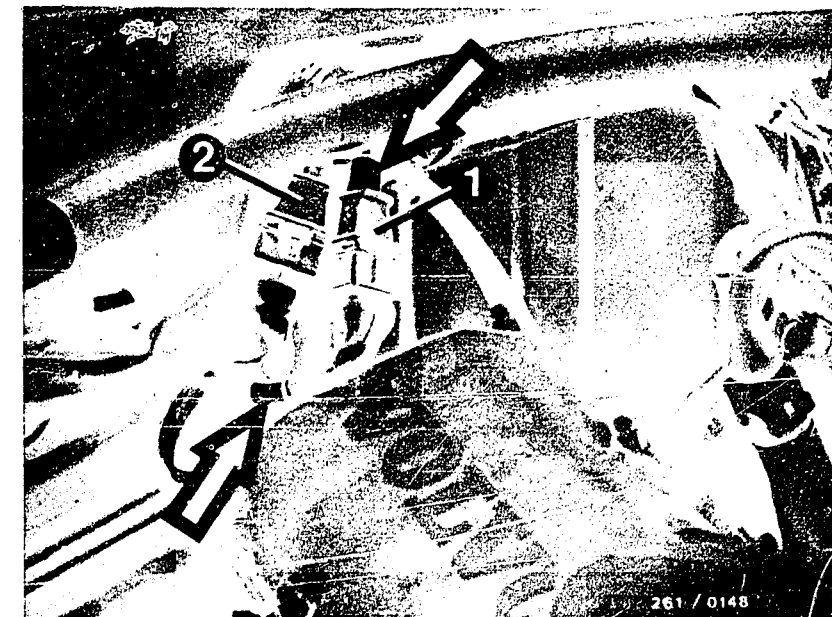
Do not use force when inserting.

When mounting, make sure that the connectors are connected the right way round.

Ensure proper seating and latching of spring contacts in connector.

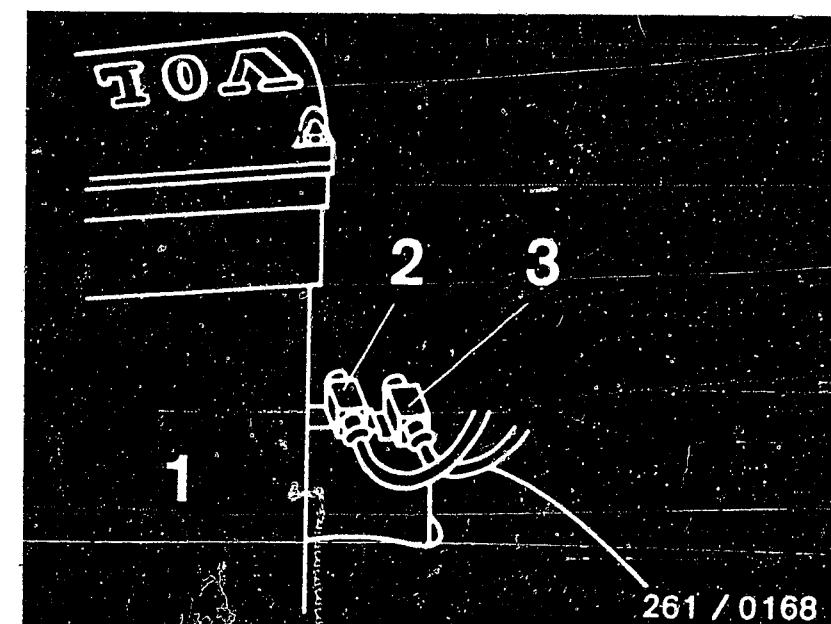
Spring contacts must not allow themselves to be pushed back.

Continued on D 11/D 12



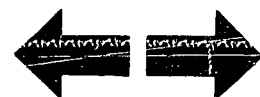
Connectors of
1 = Reference-mark sensor
2 = Engine-speed sensor
Arrows = Marking

1 = Engine block
2 = Engine-speed sensor
3 = Reference-mark sensor



D9

Test with universal test adapter
Volvo 760 Turbo



D10

Test with universal test adapter
Volvo 760 Turbo

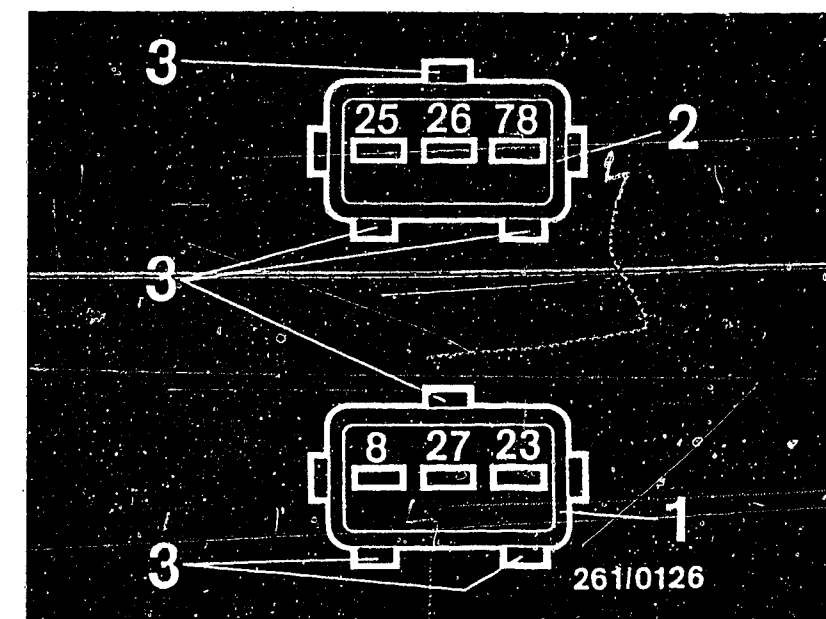


Trouble-shooting - test step 17 (continued)

● Incorrect signal:

Signal incorrect if negative peak comes first.

Check connection of leads according to circuit diagram and picture opposite.



Top view of connectors for sensors

1 = Connector for engine-speed sensor

2 = Connector for reference-mark sensor with marking

3 = Locating lug

78, 25, 26, 23, 8, 27 =
Terminal numbers

D11

Test with universal test adapter
Volvo 760 Turbo

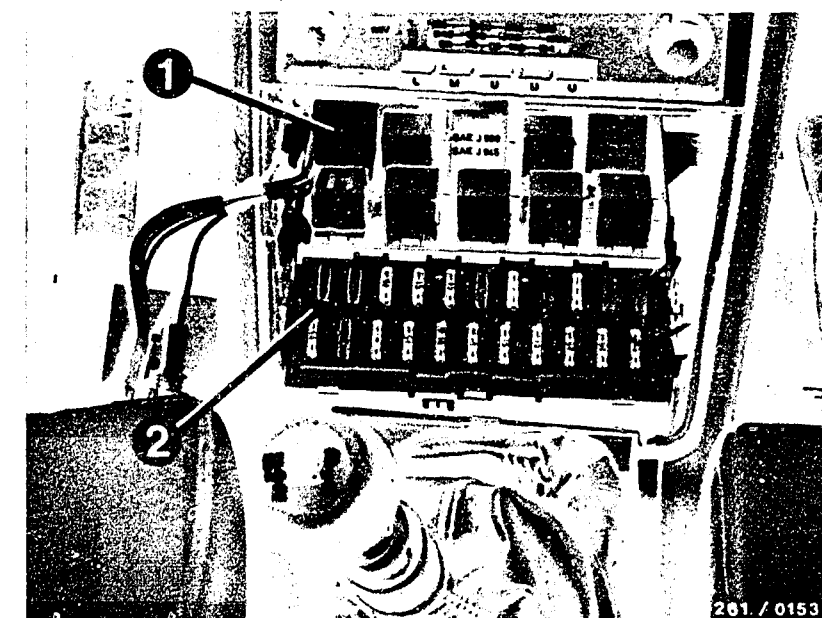


D12

Test with universal test adapter
Volvo 760 Turbo

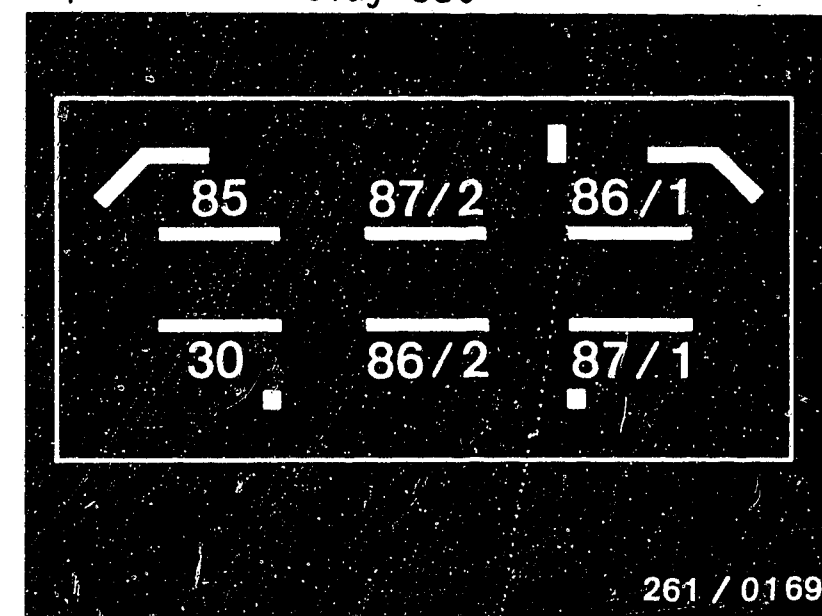


TEST STEP 20: (test steps 18 and 19 deleted)			Ignition off. Connect control unit and relay set	
Operation		Reading	Testing	
Program switch position "V"		6	Multimeter must indicate	
Program switch position "Ω"		15	10 ... 15 V	
Measuring equipment:		If reading O.K., continue testing with next test step		
Multimeter (V range)				
Measuring range:				
15 V				
Connection: Test sockets, (red = +, black = ground)		V	Operation: Supply voltage for control unit at terminals 35 (+) and 5 (ground)	
Operation in vehicle:		Malfunction: Voltage less than 10 V		
Switch on ignition				



1 = Relay set
2 = Fuses

Top view of relay set



Trouble-shooting:

1. Voltage less than 10 V: Battery insufficiently charged or high voltage drops across terminals. Test fuse No. 1.

2. No voltage reading: Check relay set. Perform following voltage measurements at relay with ignition on:

- Measure battery voltage at term. 87/2, term. 85 and term. 30.
Measure ground connection term. 86/2 to B+.
- Check lead from relay set term. 30 to multiple plug term. 35.
- Check Motronic ground terminal on fuel-distribution pipe and ground lead.

D13

Test with universal test adapter
Volvo 760 Turbo

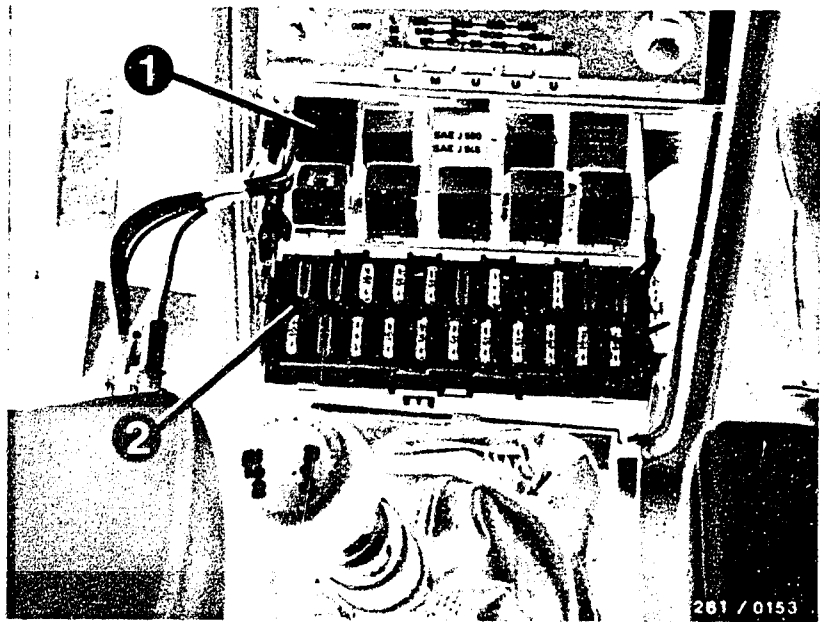


D14

Test with universal test adapter
Volvo 760 Turbo

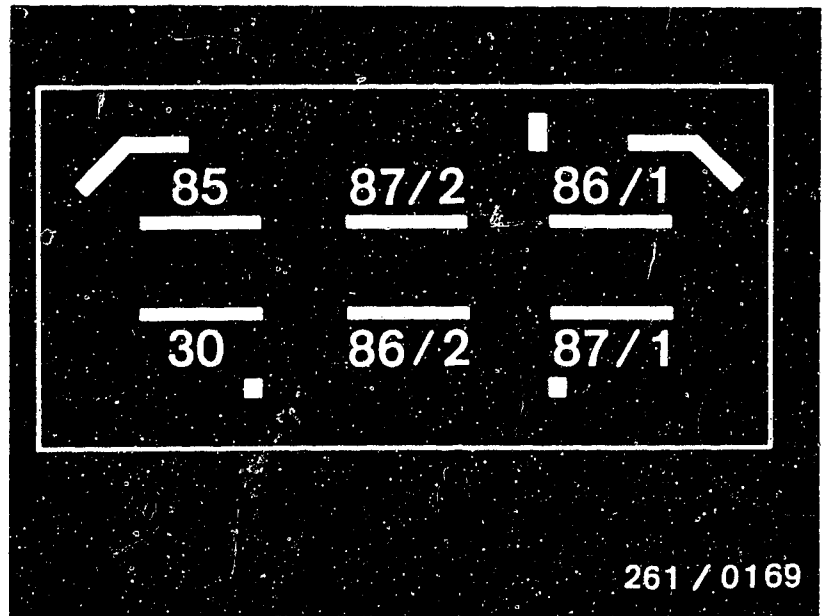


Test step 21		Reading	Testing
Operation			
Program switch position "V"	7	Multimeter must indicate <u>10 ... 15 V</u>	<u>Components:</u> Relay set (main relay)
Program switch position "Ω"	15		
Measuring equipment: multimeter (V range)		If reading O.K., continue testing with <u>next test step</u>	<u>Operation:</u> Supply voltage for control unit at terminals 18 (+) and 5 (ground)
Measuring range: 15 V			
Connection: Test sockets, (red = +, black = ground)	V		<u>Malfunction:</u> Voltage less than 10 V
Operation in vehicle: Switch on ignition			



1 = Relay set
2 = Fuses

Top view of relay set



Trouble-shooting:

- Check lead from multiple plug term. 18 to relay set term. 30.

D15

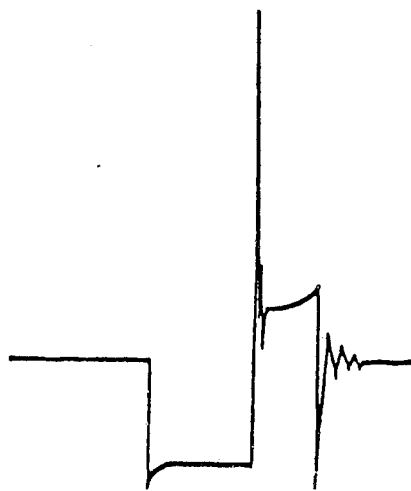
Test with universal test adapter
Volvo 760 Turbo



D16

Test with universal test adapter
Volvo 760 Turbo



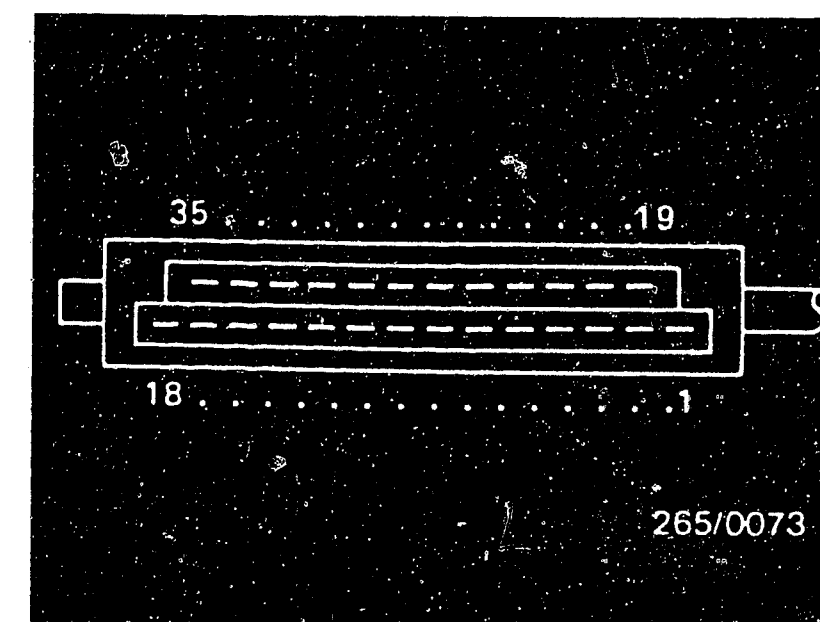
Test step 22			
Operation		Reading	Testing
Program switch position "V"		5	Primary signal present
Program switch position "Ω"			
		15	
Measuring equipment:			Component: Ignition coil, H.T. ignition cables, control unit
Motortester, oscilloscope			
Measuring range:			
Special input			
Connection: Test wells; red clip to red well, black clip to black well, triggering on cylinder 1			
Operation in vehicle:		If reading O.K., continue testing with next test step	Operation: Primary signal from ignition coil terminal 1 to ground
Shift gear to neutral and operate starting motor			
			Malfunction: No signal or incorrect signal.

Trouble-shooting

- Test Motronic ground terminal on fuel-distribution pipe: Terminal must be bare down to the metal and screw must be tight.
- Test ignition coil including leads and high-voltage cables. It must not be possible to push back spring contact on multiple plug term. 1.
- Check lead from ignition coil term. 15 to ignition lock term. 15.
- Replace control unit.

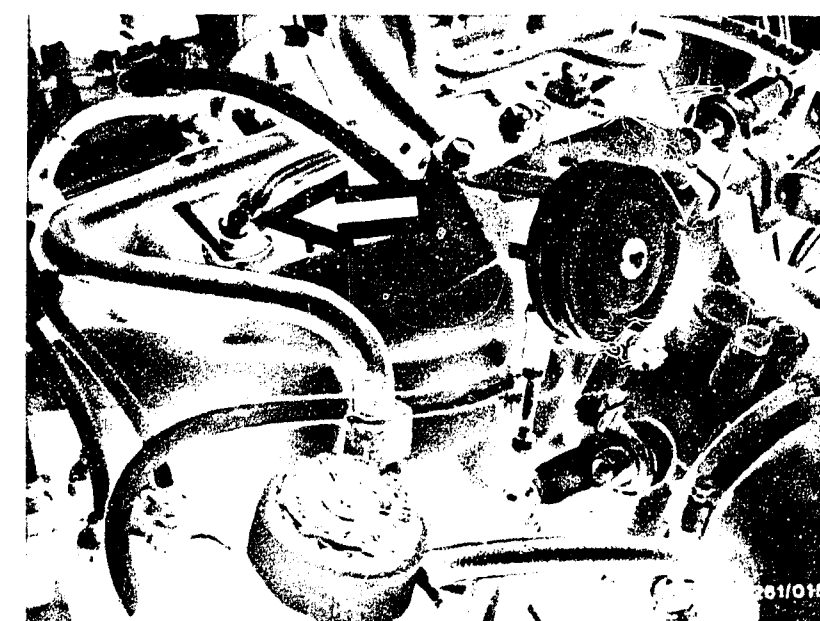
Note:

To rule out confusion between the control units of the various systems, a mechanical locking system has been introduced. The "lug" (pivot point when opening and connecting the control unit) and the corresponding mount on the control unit have matching recesses and pins.



Top view of 35-pin multiple plug

Arrow = Ground terminal



D17

Test with universal test adapter
Volvo 760 Turbo

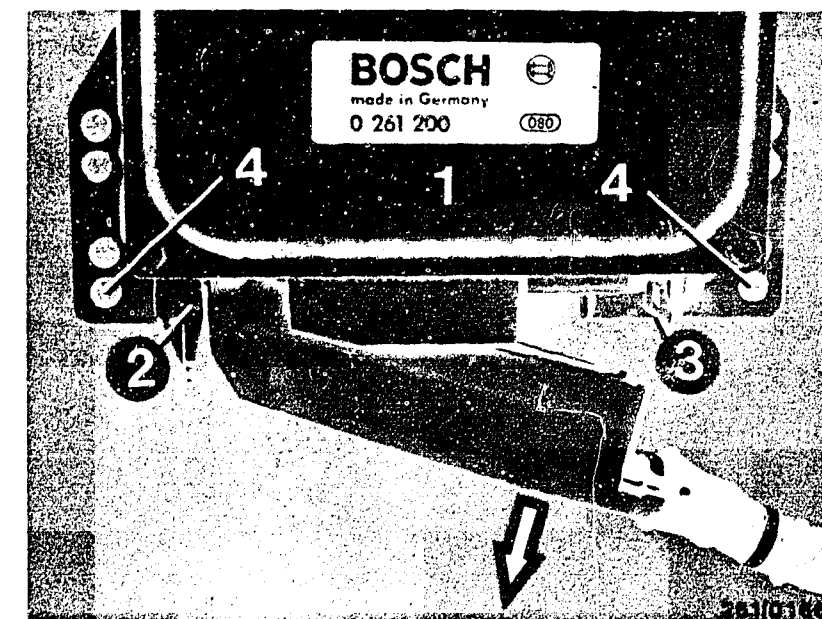


D18

Test with universal test adapter
Volvo 760 Turbo



Test step 23			
Operation		Reading	Testing
Program switch position "V"	8	Multimeter must indicate: <u>greater than 7 V</u> 	



- 1 = Control unit
- 2 = Locating lug
- 3 = Detent
- 4 = Mounting hole

• Trouble-shooting:

Replace control unit.

Note:

To rule out confusion between the control units of the various systems, a mechanical locking system has been introduced. The "lug" (pivot point when opening and connecting the control unit) and the corresponding mount on the control unit have matching recesses and pins.

D 19

Test with universal test adapter
Volvo 760 Turbo

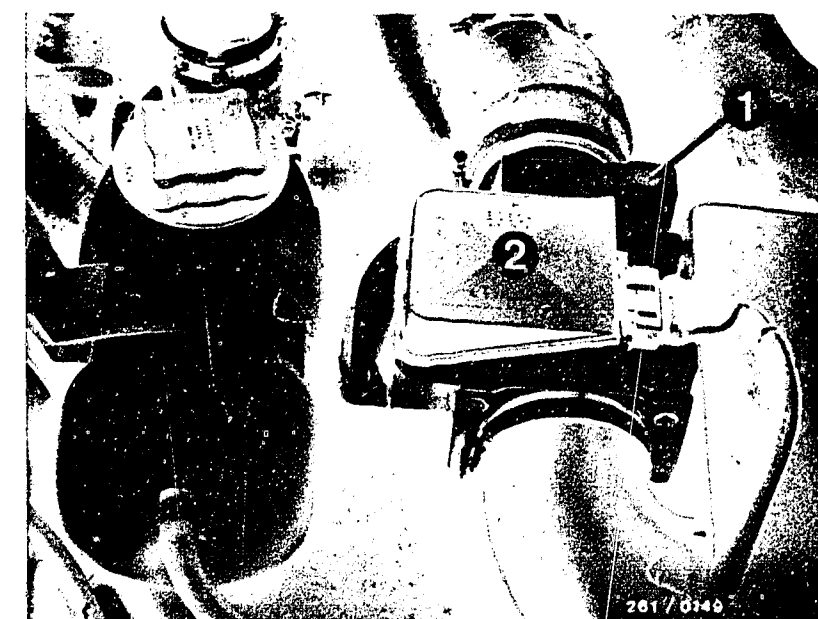


D 20

Test with universal test adapter
Volvo 760 Turbo

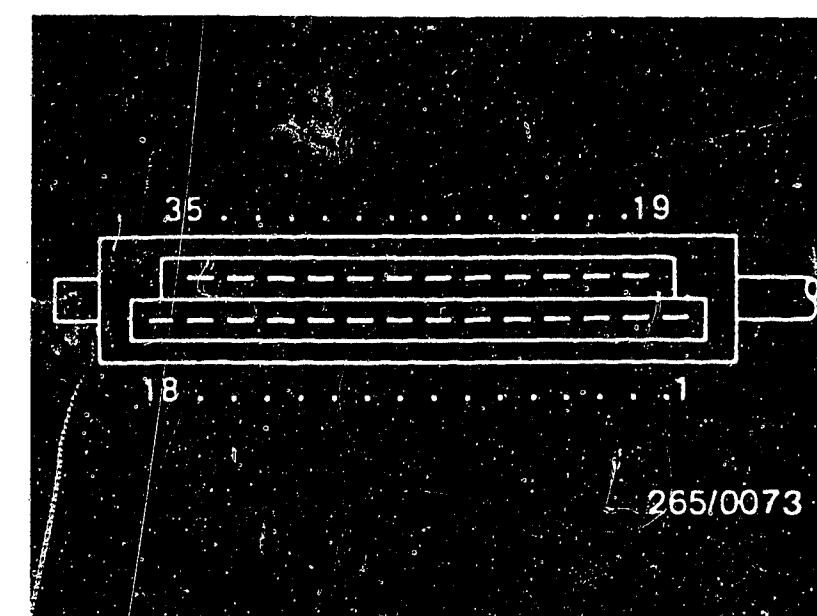


Test step 24			
Operation		Reading	Testing
Program switch position "V"	9	Multimeter must indicate <u>100 ... 250 mV</u> with sensor flap closed. Loosen hose from air-flow sensor and open sensor flap by hand. Sensor flap must not catch and must return automatically to rest position when released. With sensor flap fully open the reading rises to above <u>6.5 V</u> (select different measuring range).	<u>Component:</u> Air-flow sensor
Program switch position "Ω"	15		
<u>Measuring equipment:</u> Multimeter (V range)			If reading O.K., continue testing with next test step. Test step 25 deleted.
<u>Measuring range</u> 1.5 V			
<u>Connection:</u> Test sockets (red = +, black = ground) V		<u>Malfunction:</u> No voltage or voltage too low	
<u>Operation in vehicle:</u> Switch on ignition			



1 = Idle-mixture-adjusting screw
2 = Air-flow sensor with NTC I

Top view of 35-pin multiple plug



Trouble-shooting:

No reading:

- Check leads from air-flow sensor Term. 6, 7 and 9 to multiple plug Term. 6, 7 and 9.
- Spring contacts must not allow themselves to be pushed back.

Reading outside tolerance:

- Check whether air-flow sensor flap is closing fully.
- Replace air-flow sensor.

D21

Test with universal test adapter
Volvo 760 Turbo

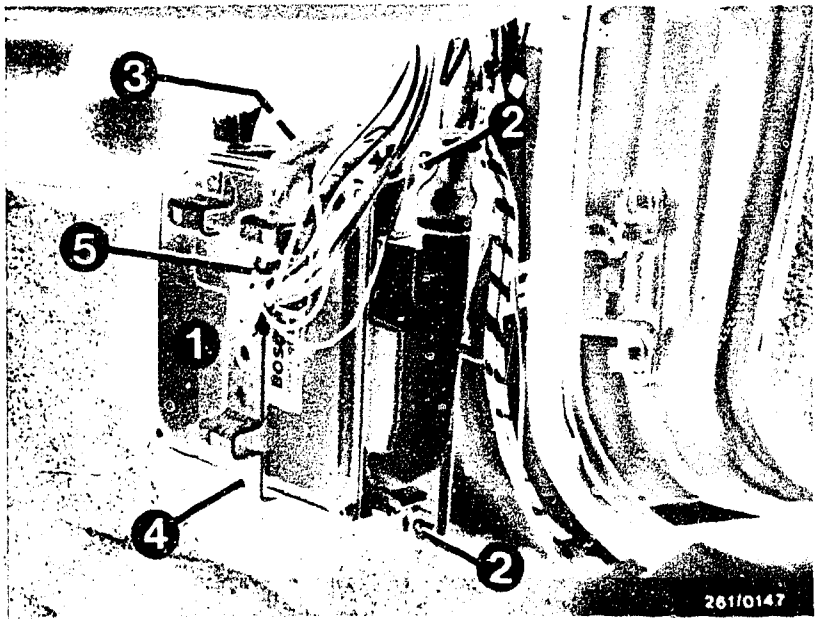


D22

Test with universal test adapter
Volvo 760 Turbo

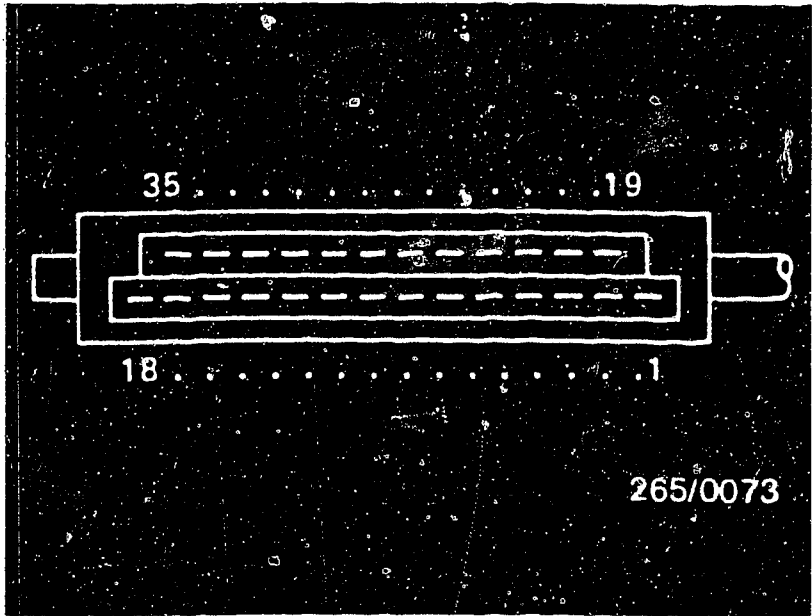


TEST STEP 26 (perform only if an air conditioner is installed, test step 25 deleted).			
<u>Operation:</u>		<u>Reading</u>	<u>Testing</u>
<u>Program switch "V" at position:</u>	11	Multimeter must indicate <u>0 V</u> with air conditioner on. If reading O.K., continue testing with <u>next test step.</u>	<u>Component:</u> Reed relay for air conditioner
<u>Program switch "Ω" at position:</u>	15		
<u>Measuring equipment:</u> Multimeter (V-range)			
<u>Measuring range:</u> 15 V			
<u>Connection:</u> Test sockets (red = +, black = ground)	V		
<u>Operation in vehicle:</u> Switch on ignition and air conditioner.			<u>Operation:</u> Switching, term. 28 to ground.
			<u>Malfunction:</u> Voltage greater than 0 V



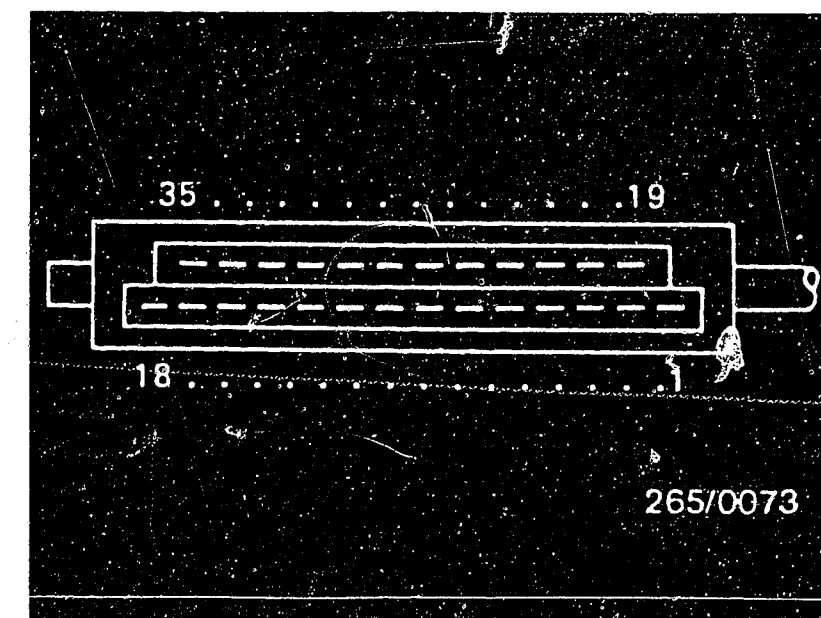
1 = Control unit
3 = Reed relay for air conditioner

Top view of 35-pin multiple plug



265/0073

Test step 27				
Operation		Reading	Testing	
Program switch position "V"	12	Multimeter must indicate 8 ... 15 V during cranking. If reading O.K., continue testing with next test step	<u>Component:</u> Lead 4 from starting motor Term. 50 to multiple plug Term. 4	
Program switch position "Ω"	15			
Measuring equipment: Multimeter (V range)				
Measuring range: 15 V			<u>Operation:</u> Voltage test at terminal 4	
Connection: Test sockets (red = +, black = ground)	V		<u>Malfunction:</u> Voltage less than 8 V	
<u>Operation in vehicle:</u> Shift gear to neutral and operate starting motor.				



Top view of 35-pin multiple plug

Trouble-shooting:

1. Voltage less than 8 V:

- Test voltage drop at starting motor terminal 50.
- Check lead from multiple plug terminal 4 to starting motor terminal 50.

E1

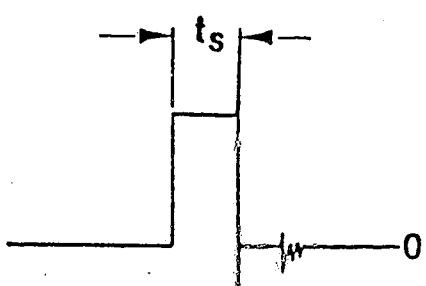
Test with universal test adapter
Volvo 760 Turbo



E2

Test with universal test adapter
Volvo 760 Turbo



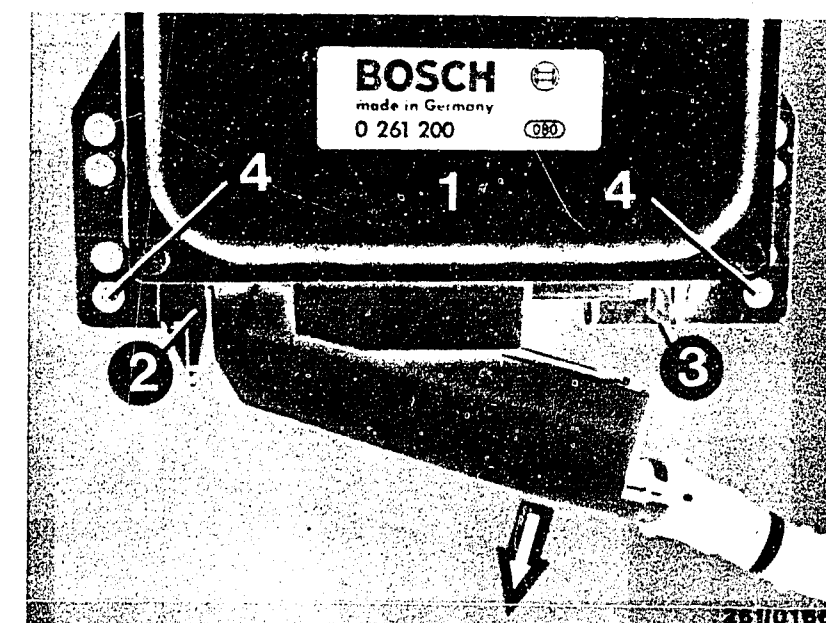
Test step 28			
Operation		Reading	Testing
Program switch position "V"	13		<u>Component:</u> Control unit
Program switch position "Ω"	15		
<u>Measuring equipment:</u> Motortester, oscilloscope		t_s = Dwell period 0 = Base line If reading O.K., continue testing with <u>next test step</u>	<u>Operation:</u> Dwell-period signal at terminal 21 and ground
<u>Measuring range:</u> Special input			<u>Malfunction:</u> No signal
<u>Connection:</u> Test wells; red clip to red well, black clip to black well			
<u>Operation in vehicle:</u> Shift gear to neutral and operate starting motor			

Trouble-shooting:

- Replace control unit

Note:

To rule out confusion between the control units of the various systems, a mechanical locking system has been introduced. The "lug" (pivot point when opening and connecting the control unit) and the corresponding mount on the control unit have matching recesses and pins.



- 1 = Control unit
- 2 = Locating lug
- 3 = Detent
- 4 = Mounting hole

E3

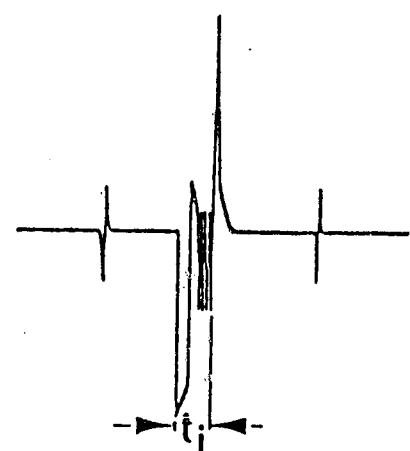
Test with universal test adapter
Volvo 760 Turbo

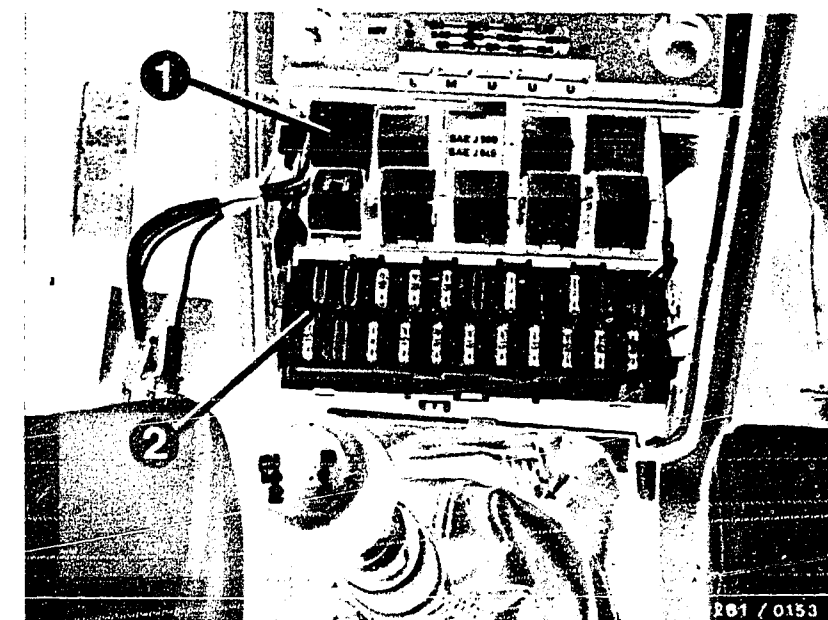


E4

Test with universal test adapter
Volvo 760 Turbo



Test step 29		Reading	Testing
Operation			
Program switch position "V"	14		<u>Component:</u>
Program switch position "Ω"	15		Power supply for solenoid-operated injection valves, control unit
<u>Measuring equipment:</u>			
Motortester, oscilloscope			Injection output stage at terminal 14 and ground
<u>Measuring range:</u>			
Special input		t_i = Duration of injection	
<u>Connection:</u> Test wells; red clip to red well, black clip to black well			<u>Malfunction:</u>
<u>Operation in vehicle:</u>			No signal
Shift gear to neutral and operate starting motor		If reading O.K., continue testing with <u>next test step</u>	



1 = Relay set
2 = Fuses

1 = Control unit
2 = Locating lug
3 = Detent
4 = Mounting hole

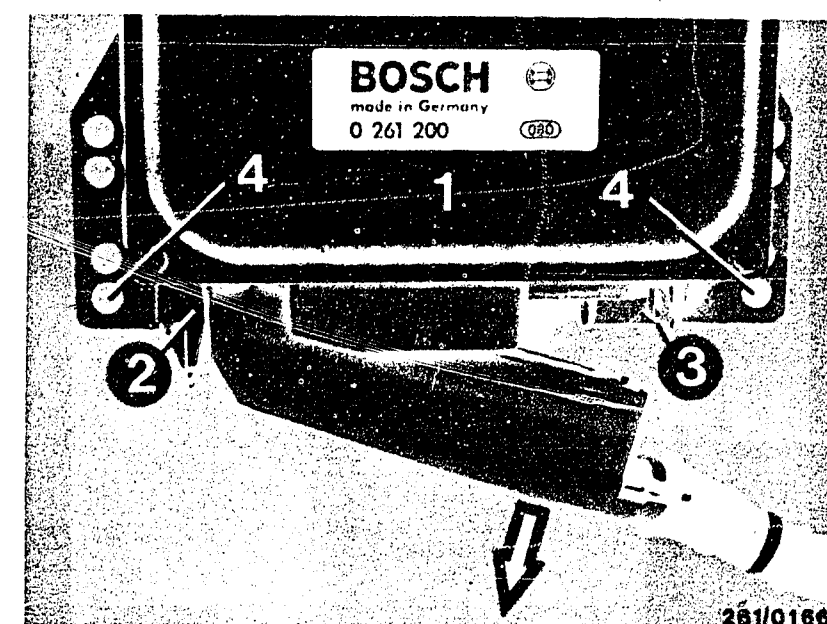
Trouble-shooting:

- Test power supply to injection valves.
Disconnect connector from all injection valves and measure voltage to ground at both terminals. The battery voltage must be measured at each injection-valve connector. If no voltage, test leads to relay set term. 30.
Caution! Positive lead from injection valve cyl. 2 leads through time-delay relay term. 87 and term. 15. If necessary, replace time-delay relay.

- Test lead from multiple plug term. 14 to the injection valves of cylinders 3 and 4.

- Replace control unit.

Note: To rule out confusion between the control units of the various systems, a mechanical locking system has been introduced. The "lug" (pivot point when opening and connecting the control unit) and the corresponding mount on the control unit have matching recesses and pins.



E5

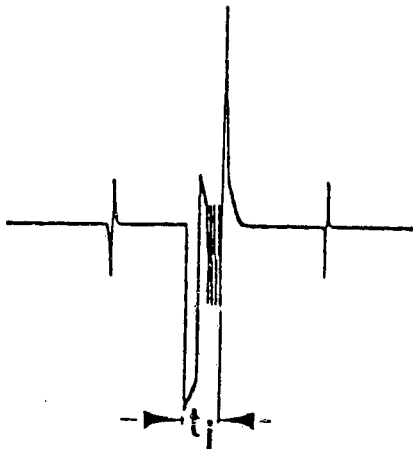
Test with universal test adapter
Volvo 760 Turbo

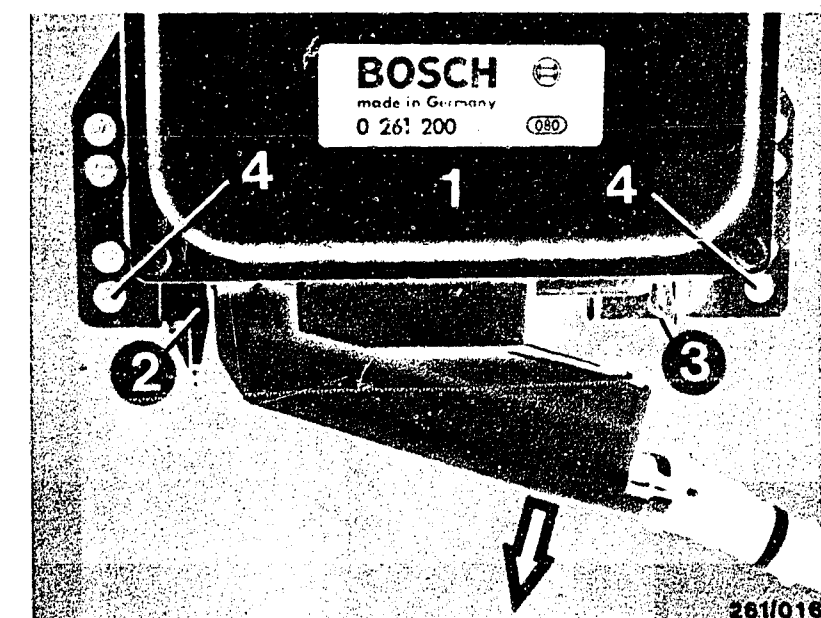


E6

Test with universal test adapter
Volvo 760 Turbo



Test step 30			
Operation		Reading	Testing
Program switch position "V"	14	Duration of injection t_i becomes slightly longer after pressing button T1 (NTC II, cold). <u>Press T1 only briefly, otherwise mixture will be over-enriched.</u>	<u>Component:</u> Control unit
Program switch position "Ω"			
<u>Measuring equipment:</u> Motortester, oscilloscope			
<u>Measuring range:</u> Special input			
<u>Connection:</u> Test wells; red clip to red well, black clip to black well			
<u>Operation in vehicle:</u> Shift gear to neutral and operate starting motor			<u>Operation:</u> Influence of temperature
<u>Button:</u> Press T1			
		t_i = Duration of injection	<u>Malfunction:</u> Signal does not become wider after pressing button T1



- 1 = Control unit
- 2 = Lug
- 3 = Detent
- 4 = Mounting holes

Trouble-shooting:

Replace control unit

Note:

To rule out confusion between the control units of the various systems, a mechanical locking system has been introduced. The "lug" (pivot point when opening and connecting the control unit) and the corresponding mount on the control unit have matching recesses and pins.

E7

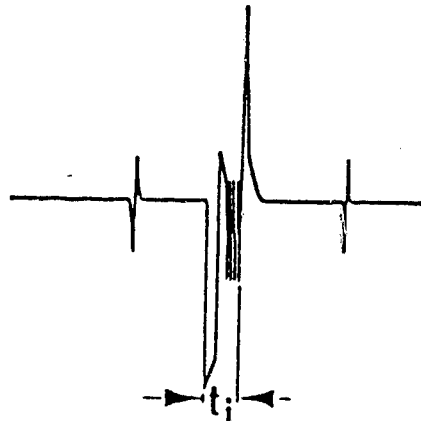
Test with universal test adapter
Volvo 760 Turbo

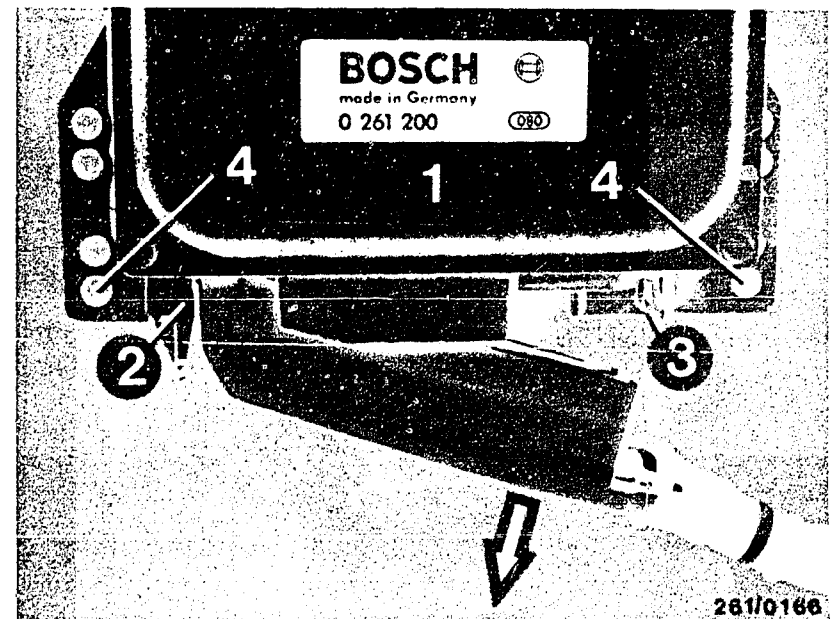


E8

Test with universal test adapter
Volvo 760 Turbo



Test step 31		Reading	Testing
Operation			
Program switch position "V"	15	 <p>t_i = Duration of injection</p>	<u>Component:</u> Control unit
Program switch position "Ω"	15		
<u>Measuring equipment:</u> Motortester, oscilloscope			<u>Operation:</u> Injection output stage at terminal 15 and ground
<u>Measuring range:</u> Special input			
<u>Connection:</u> Test wells; red clip to red well, black clip to black well			<u>Malfunction:</u> No signal
<u>Operation in vehicle:</u> Shift gear to neutral and operate starting motor		<u>If reading O.K., continue testing with next test step</u>	



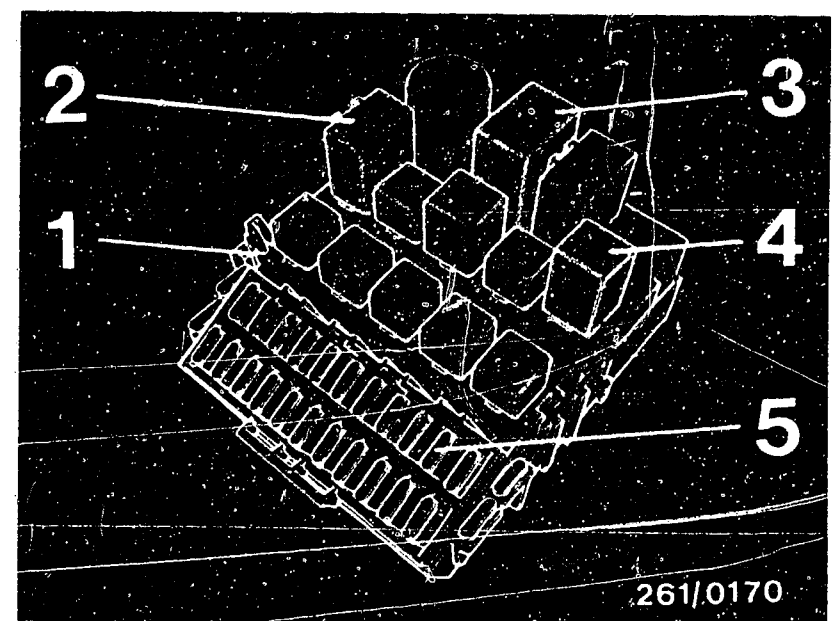
- 1 = Control unit
2 = Lug
3 = Detent
4 = Mounting holes

- 1 = Central-electrics console
2 = Relay set
3 = Time-delay relay
4 = Relay for overdrive
5 = Fuses

Trouble-shooting:

- Test power supply to injection valves.
Disconnect connector from all injection valves and measure voltage to ground at both terminals. The battery voltage must be measured at each injection-valve connector. If no voltage, test leads to relay set term. 30.
Caution! Positive lead from injection valve cyl. 2 leads through time-delay relay term. 87 and term. 15. If necessary, replace time-delay relay.
- Test lead from multiple plug term. 14 to the injection valves of cylinders 3 and 4.
- Replace control unit.

Note: To rule out confusion between the control units of the various systems, a mechanical locking system has been introduced. The "lug" (pivot point when opening and connecting the control unit) and the corresponding mount on the control unit have matching recesses and pins.



E9

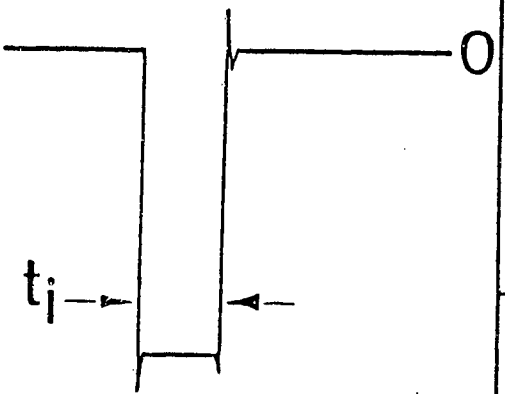
Test with universal test adapter
Volvo 760 Turbo



E10

Test with universal test adapter
Volvo 760 Turbo



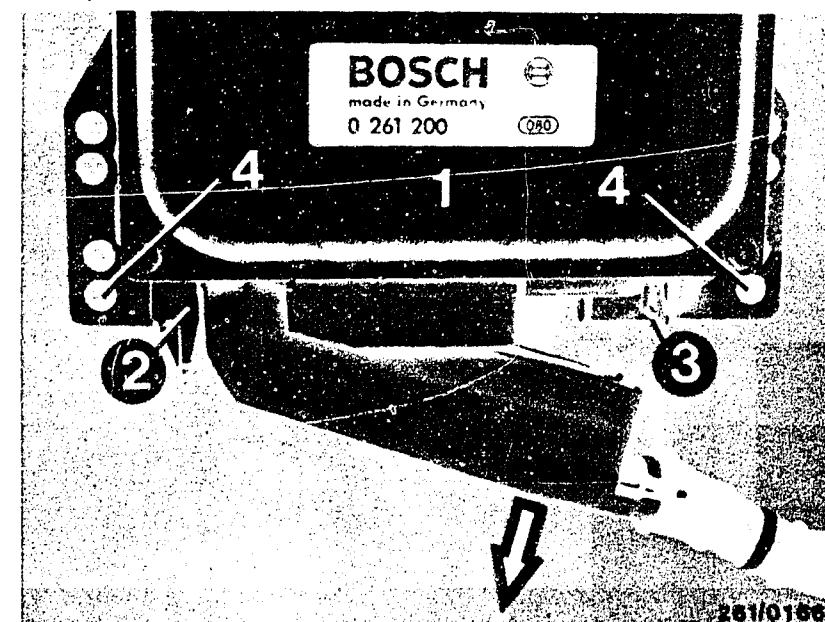
Test step 32			
Operation		Reading	Testing
Program switch position "V"	16	 <p>t_i = Duration of injection 0 = Base line</p> <p>If reading O.K., continue testing with next test step</p>	Component: Control unit
Program switch position "Ω"	15		
Measuring equipment: Motortester, oscilloscope			Operation: Injection signal at terminal 11 and ground
Measuring range: Special input			Malfunction: No signal
Connection: Test wells; red clip to red well, black clip to black well			
Operation in vehicle: Shift gear to neutral and operate starting motor			

Trouble-shooting:

Replace control unit.

Note:

To rule out confusion between the control units of the various systems, a mechanical locking system has been introduced. The "lug" (pivot point when opening and connecting the control unit) and the corresponding mount on the control unit have matching recesses and pins.



- 1 = Control unit
- 2 = Locating lug
- 3 = Detent
- 4 = Mounting hole

E11

Test with universal test adapter
Volvo 760 Turbo

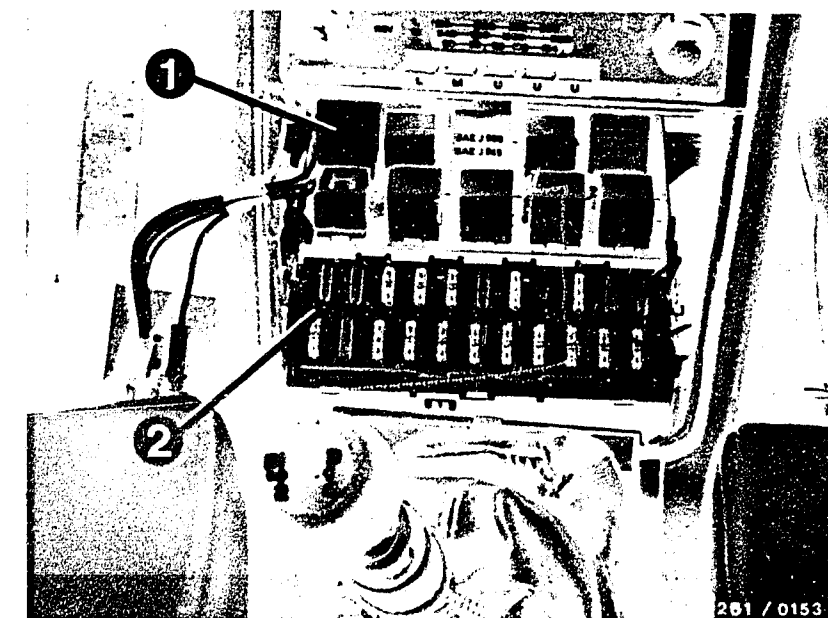


E12

Test with universal test adapter
Volvo 760 Turbo



Test step 33*			
Operation		Reading	Testing
Program switch position "V"	17	Multimeter must indicate 10...15 V	<u>Component:</u> Relay set (pump relay)
Program switch position "Ω"	15		
<u>Measuring equipment':</u> Multimeter (V range)		If reading O.K., continue testing with <u>next test step</u>	<u>Operation:</u> Voltage at Term. 20 to ground
<u>Measuring range:</u> 15 V			
Connection: Test sockets; (red = +, black = ground)	V		<u>Malfunction:</u> Voltage less than 10 V
<u>Operation in vehicle:</u> Ignition on			



1 = Relay set
2 = Fuses

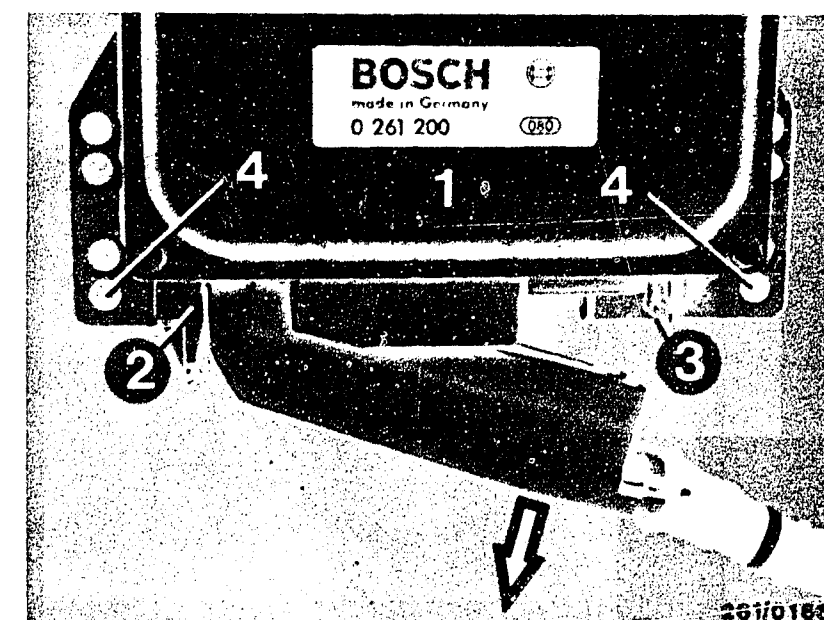
1 = Control unit
2 = Locating lug
3 = Detent
4 = Mounting hole

Trouble-shooting:

- Replace relay set.
- Test lead from multiple plug term. 20 through charge-air pressure switch to relay set term. 86/1.
- Charge-air pressure switch (installed under instrument panel) defective.
- Replace control unit.

Note:

To rule out confusion between the control units of the various systems, a mechanical locking system has been introduced. The "lug" (pivot point when opening and connecting the control unit) and the corresponding mount on the control unit have matching recesses and pins.



E13

Test with universal test adapter
Volvo 760 Turbo

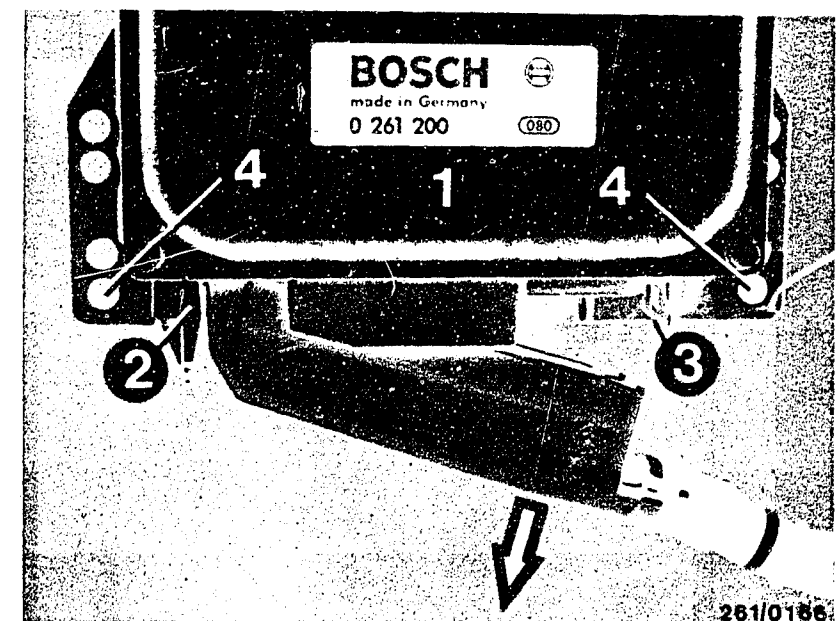


E14

Test with universal test adapter
Volvo 760 Turbo



Test step 34			
Operation		Reading	Testing
Program switch position "V"	17	Multimeter must indicate max. 4 V	<u>Component:</u> Control unit
Program switch position "Ω"	15		
Measuring equipment: Multimeter (V range)			
Measuring range:		If reading O.K., continue testing with next test step	<u>Operation:</u> Pump control Term. 20 to ground
15 V			
Connection: Test sockets; (red = +, black = ground)	V		
<u>Operation in vehicle:</u> Shift gear to neutral and operate starting motor			<u>Malfunction:</u> Voltage greater than 4 V



- 1 = Control unit
- 2 = Locating lug
- 3 = Detent
- 4 = Mounting hole

Trouble-shooting:

Replace control unit.

Note:

To rule out confusion between the control units of the various systems, a mechanical locking system has been introduced. The "lug" (pivot point when opening and connecting the control unit) and the corresponding mount on the control unit have matching recesses and pins.

E15

Test with universal test adapter
Volvo 760 Turbo

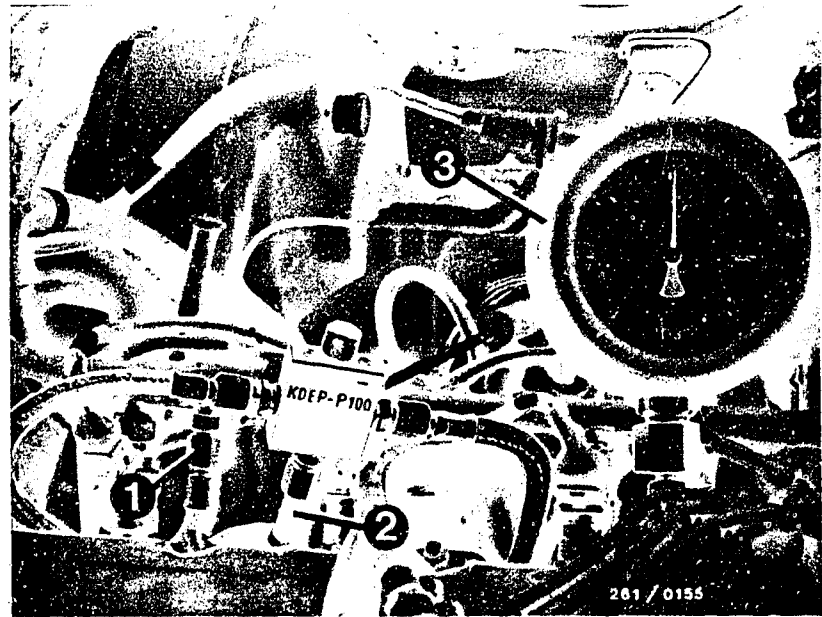


E16

Test with universal test adapter
Volvo 760 Turbo

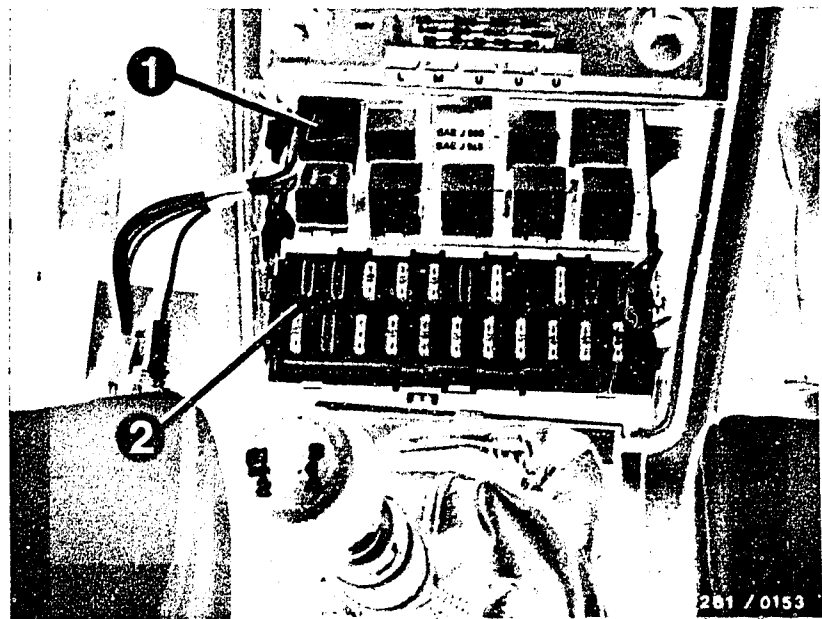


Test step 35 Switch off ignition. Connect pressure gauge.			
Operation		Reading	Testing
<u>Program switch position</u> "V"	17	Pressure gauge must indicate <u>2.8 ... 3.2 bar</u> If reading O.K., continue testing with <u>next test step</u>	<u>Component:</u> Relay set (pump relay), fuel pump, pressure regulator
<u>Program switch position</u> "Ω"	15		
<u>Measuring equipment:</u> Pressure gauge			
<u>Measuring range:</u> 0 to 6 bar			
<u>Connection:</u> On fuel-distribution pipe			
<u>Operation in vehicle:</u> Switch on ignition			
<u>Button:</u> Press T3			
		<u>Operation:</u> Fuel pressure	
		<u>Malfunction:</u> No fuel pressure or pressure outside tolerance	



- 1 = Connection on fuel-distribution pipe
- 2 = Hose to start valve
- 3 = Pressure gauge

- 1 = Relay set
- 2 = Fuses



Note:

Connect pressure gauge to fuel-distribution pipe. To do this, unscrew fuel line to start valve.

Caution

Catch escaping fuel. Danger of fire with hot engine and electrical sparks.

Continued on E19/E20

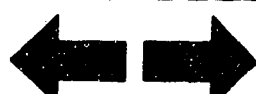
E17

Test with universal test adapter
Volvo 760 Turbo



E18

Test with universal test adapter
Volvo 760 Turbo



Trouble-shooting - test step 35 (continued)

1. Pressure 0 bar, no pumping noises can be heard:

- Test pump fuse.
- Replace relay set.
- Measure voltage at disconnected pump plug.

No voltage:

Check lead from fuel pump to relay set Term. 87b as well as pump ground lead.

If voltage not sufficient:

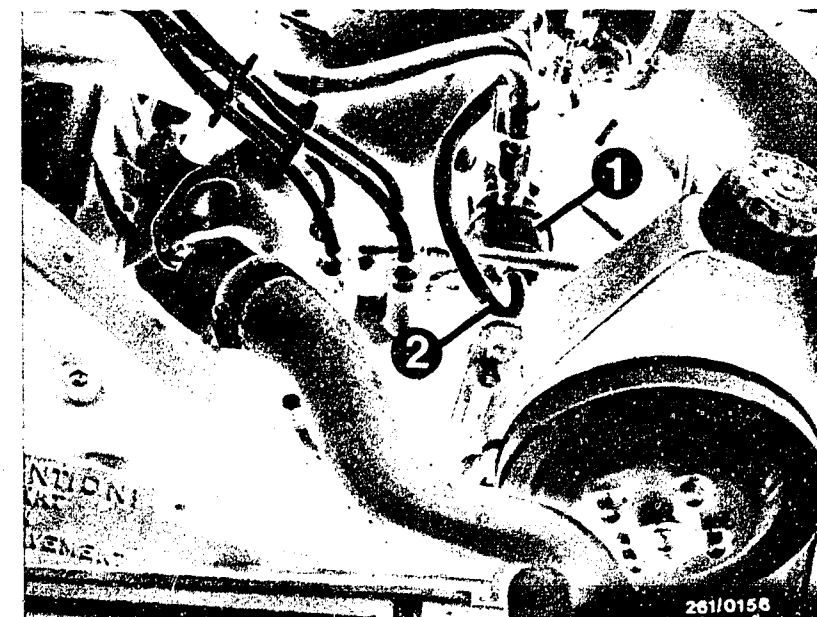
Test lead from fuel pump to pump relay term. 87 as well as pump ground lead.

- If voltage present:
Test pressure regulator and fuel pump as described below under 2.

2. Pressure outside tolerance, fuel pump operating:

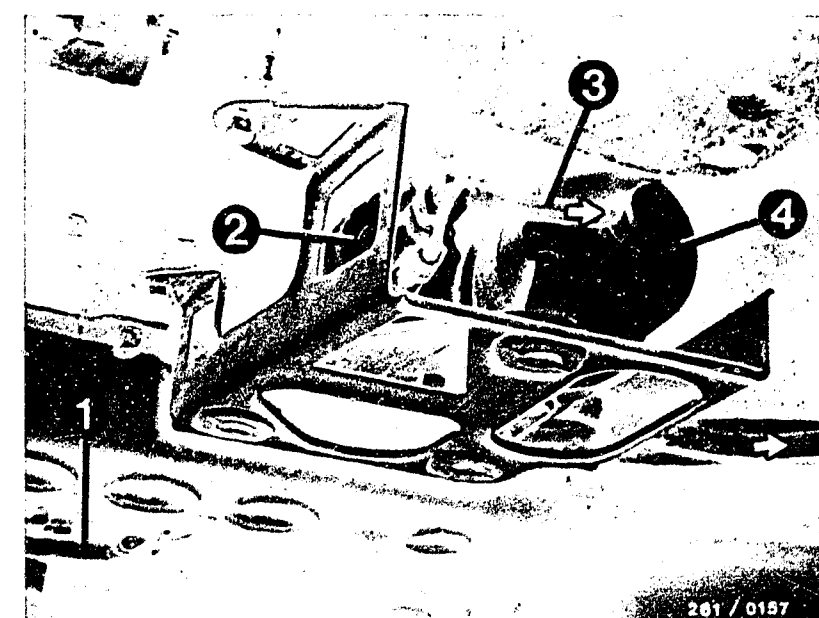
- Fuel pressure too low:
Slowly pinch off return line with hose clammer (cution! do not load pressure gauge above 6 bar). If pressure rises above 4 bar, replace pressure regulator.
If pressure remains below 4 bar, replace fuel pump.

Continued on E21/E22



1 = Pressure regulator
2 = Hose to intake manifold

1 = Fuel intake line
2 = Electric fuel pump
3 = Fuel delivery line
4 = Fuel filter
Arrows = Direction of flow



E19

Test with universal test adapter
Volvo 760 Turbo



E20

Test with universal test adapter
Volvo 760 Turbo



Touble-shooting - TEST STEP 35 (continued)

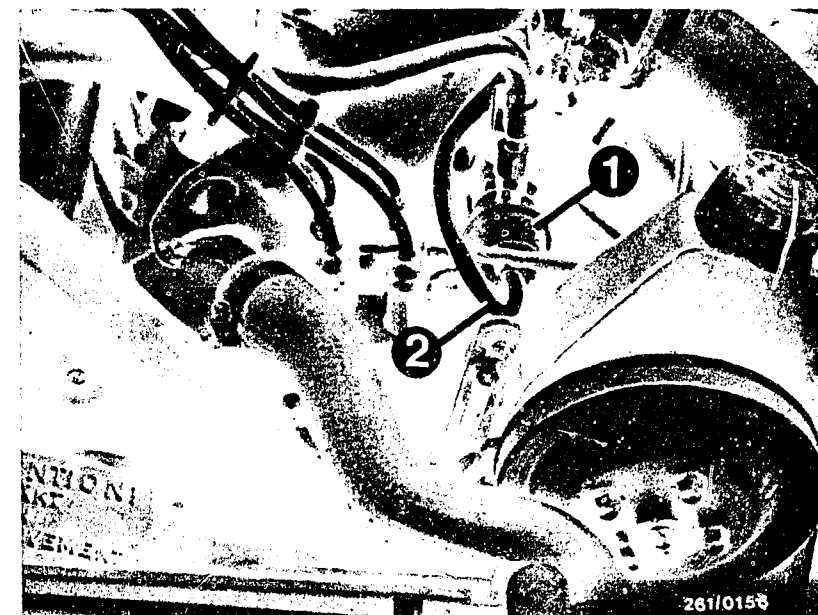
- Check fuel line and fuel filter for throughflow. Fuel lines pinched?
- Strainer in tank clogged?
- Corrosion in tank?
- Check fuse no. 15 for pre-supply pump.

• Pre-supply pump defective

Testing: Remove hose from intake fitting of main electric fuel pump and hold in measuring glass. Start stopwatch and measure time until measuring glass is half full. Empty measuring glass and hold hose in measuring glass again. Switch on pre-supply pump and start stopwatch and measure time until measuring glass is half full again. Compare times. With pre-supply pump on the filling time is shorter.

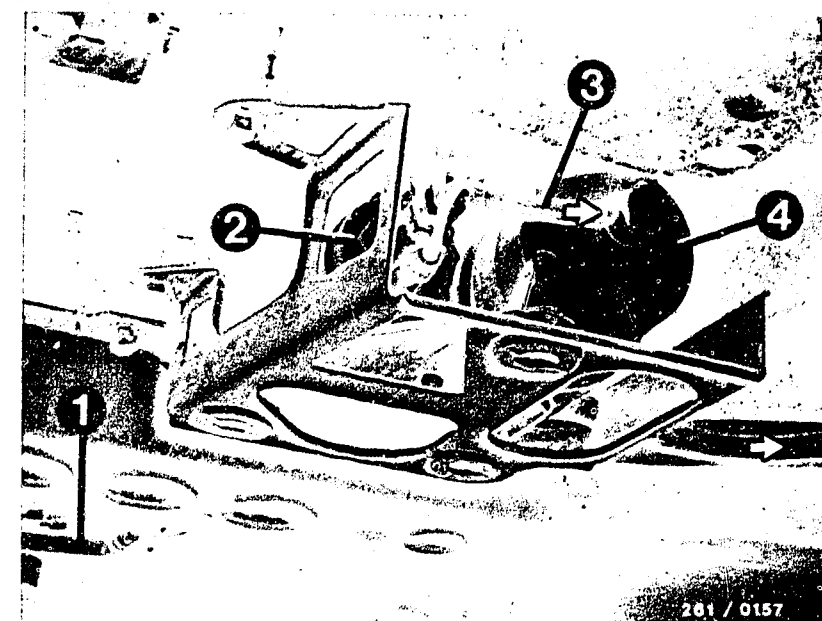
3. Fuel pressure above 3.2 bar:

- Fuel return line clogged or pinched.
- Replace pressure regulator.



1 = Pressure regulator
2 = Hose to intake manifold

1 = Fuel intake line
2 = Electric fuel pump
3 = Fuel delivery line
4 = Fuel filter
Arrows = Direction of flow



E21

Test with universal test adapter
Volvo 760 Turbo



E22

Test with universal test adapter
Volvo 760 Turbo



CAUTION!

The following test steps can only be performed with the engine running.
If the engine will not run, continue with the trouble-shooting program of your choice.
Detailed trouble-shooting - see B3 - B4
Direct trouble-shooting - See B5 - B10
For further trouble-shooting, leave the test adapter, control unit and pressure gauge connected.

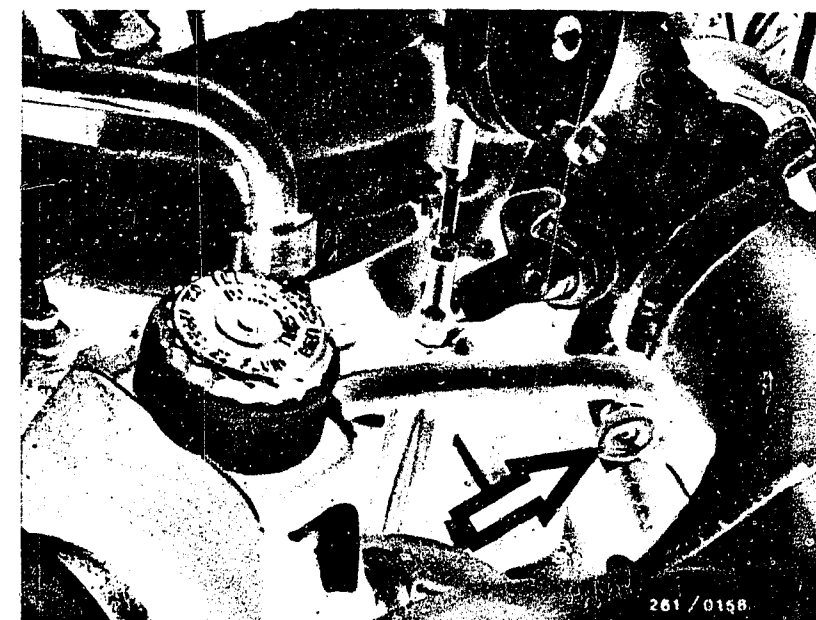
Test step 36 Connect motortester and CO analyzer

Operation		Reading	Testing
Program switch position "V"	17	1. With engine at op. temp. and with air conditioner off:	<u>Component:</u> Engine, leaks in air-intake system Idle speed and CO adjustment
Program switch position "Ω"	15	Idle speed: 850 min ⁻¹	
<u>Measuring equipment:</u> Motortester and CO analyzer		CO checking value: 1.0 ... 2.5 % CO	<u>Operation:</u> Idle speed and exhaust
<u>Measuring range:</u> Engine speed and CO		CO setting value: 1.5 % CO	
<u>Connection:</u> Ignition coil, exhaust		2. Press button T2: Values must not change.	<u>Malfunction:</u> Readings outside tolerance
<u>Operation in vehicle:</u> Let engine run at operating temperature and switch off air conditioner (if fitted)		If reading O.K., continue testing with next test step.	

Trouble-shooting:

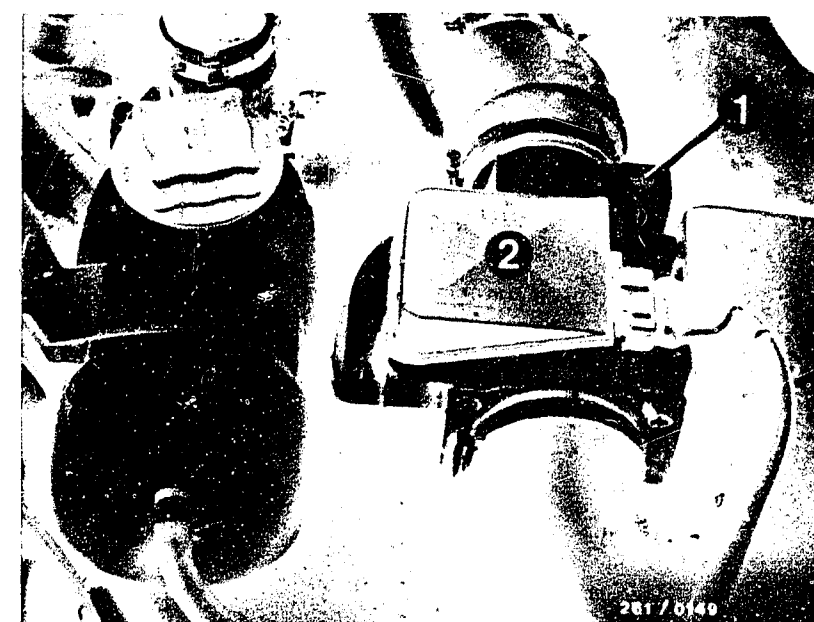
- Adjust idle speed at idle-speed-adjusting screw in throttle-valve assembly.

Continued on F 1/F 2



Arrow = Idle-speed adjusting screw

1 = Idle-mixture-adjusting screw,
2 = Air-flow sensor with NTC I



E23

Test with universal test adapter
Volvo 760 Turbo



E24

Test with universal test adapter
Volvo 760 Turbo



Trouble-shooting - TEST STEP 36 (continued)

- Adjust exhaust gas with idle-mixture-adjusting screw in air-flow sensor.

To do this, remove the plug in the air-flow sensor. After finishing the adjustment, use a new plug (red).

Turning the idle-mixture-adjusting screw in a clockwise direction:
Increases the CO concentration.

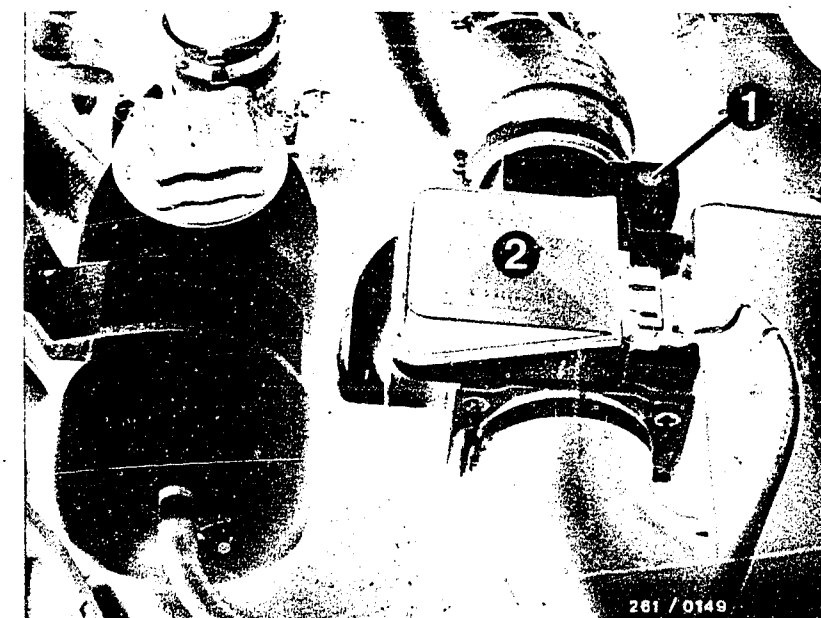
Turning the idle-mixture-adjusting screw in a counterclockwise direction:
Reduces the CO concentration.

CO concentration less than 0,5 % by vol. CO and not adjustable:

Check intake side and exhaust system for leaks (fresh air) by means of pressure test.

Concerning 2.

If the readings change after pressing button T2, the engine is not yet at normal operating temperature.



1 = Idle-mixture-adjusting screw
2 = Air-flow sensor with NTC I

F1

Test with universal test adapter
Volvo 760 Turbo

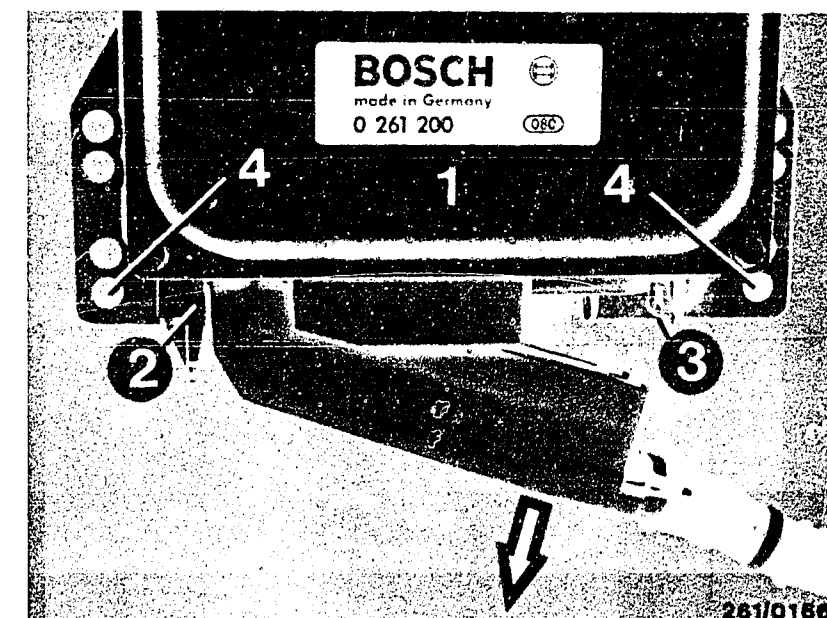


F2

Test with universal test adapter
Volvo 760 Turbo



Test step 37			
Operation		Reading	Testing
Program switch position "V"	17	1. Spark advance with engine at op. temp. and at idle speed: 5° ... 15° 2. If applicable, switch on air conditioner Spark advance 22° ... 32° i.e. the spark advance must be 17° greater than in 1.	Component: Control unit
Program switch position "N"	15		
Measuring equipment: Motortester			Operation: Spark advance at idle and with air conditioner on.
Measuring range: Spark advance			Malfunction: Spark advance outside tolerance
Connection: Timing light			
Operation in vehicle: Allow engine to reach operating temperature.		If reading O.K., continue testing with next test step	



- 1 = Control unit
- 2 = Locating lug
- 3 = Detent
- 4 = Mounting hole

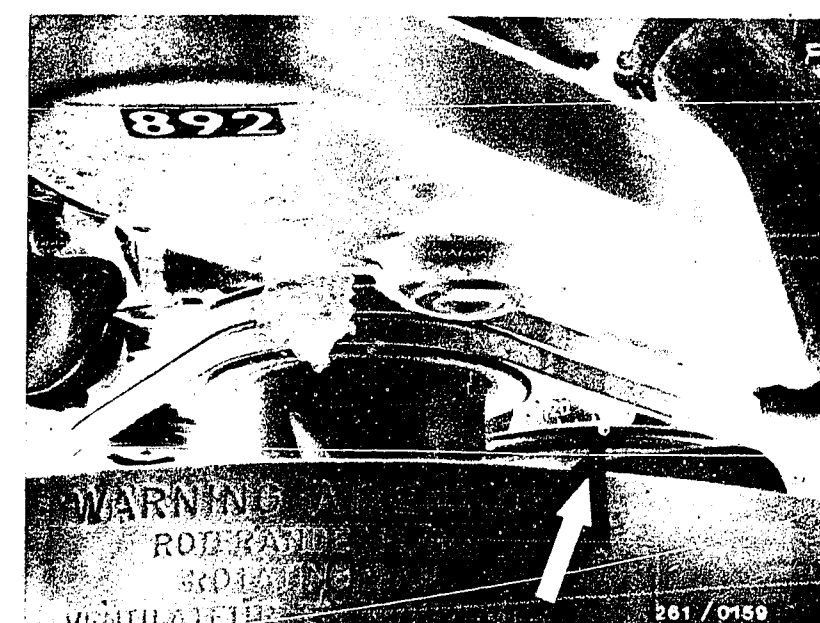
Arrow =
Moving mark on pulley and fixed degrees scale on plastic part

Trouble-shooting:

- Concerning 1. (above): Check idle speed accurately once again, and repeat test step. Idle speed must be between 800 and 900 min⁻¹, otherwise a different spark advance will be indicated.
- Concerning 1. and 2.:
Replace control unit.

Note:

To rule out confusion between the control units of the various systems, a mechanical locking system has been introduced. The "lug" (pivot point when opening and connecting the control unit) and the corresponding mount on the control unit have matching recesses and pins.



F3

Test with universal test adapter
Volvo 760 Turbo

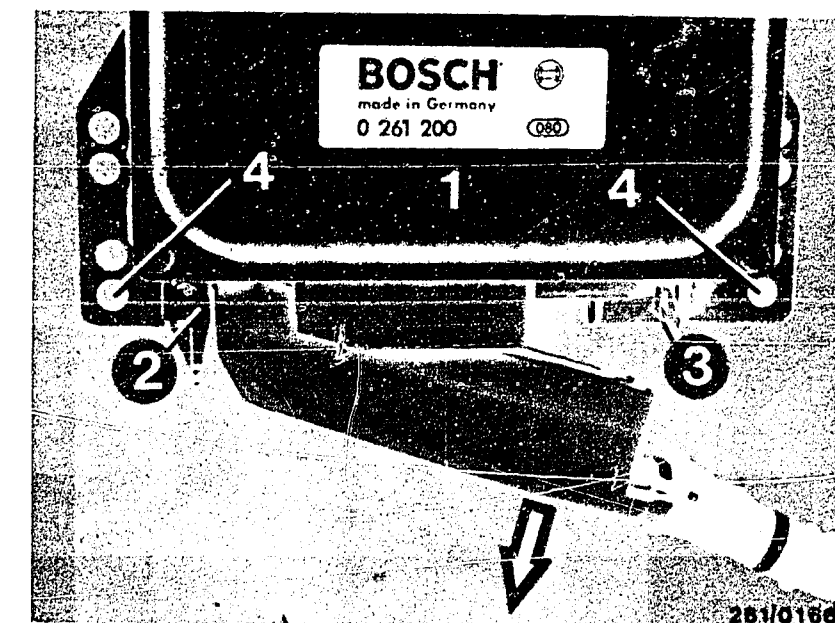


F4

Test with universal test adapter
Volvo 760 Turbo



Test step 38			
Operation		Reading	Testing
Program switch position "V"	17	1. With engine at normal operating temperature and at idle speed: 8...15° 2. At 3000 min ⁻¹ 30°...45° If reading O.K., continue testing with next test step	Component: Control unit
Program switch position "Ω"	15		
Measuring equipment: Motortester			Operation: Dwell angle
Measuring range: Dwell angle			
Connection: Ignition coil			Malfuction: Dwell angle outside tolerance
Operation in vehicle: Let engine run			



- 1 = Control unit
- 2 = Locating lug
- 3 = Detent
- 4 = Mounting hole

Trouble-shooting:

Replace control unit

Note:

To rule out confusion between the control units of the various systems, a mechanical locking system has been introduced. The "lug" (pivot point when opening and connecting the control unit) and the corresponding mount on the control unit have matching recesses and pins.

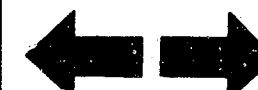
F5

Test with universal test adapter
Volvo 760 Turbo

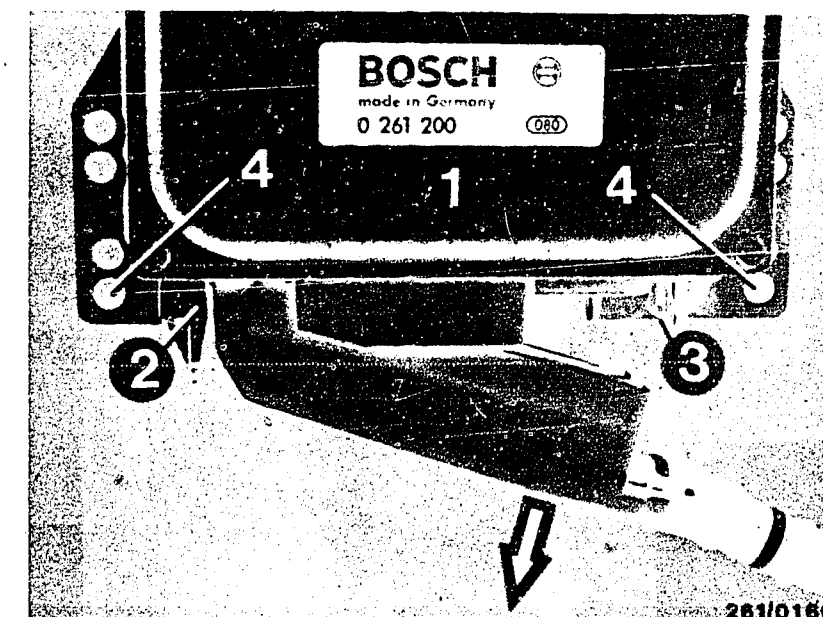


F6

Test with universal test adapter
Volvo 760 Turbo



Test step 39		Reading	Testing
Operation			
<u>Program switch position</u> "V"	17	Engine at normal operating temperature Engine speed 2000 min ⁻¹ (keep accelerator in same position). Press button T5: <u>Engine "hunts"</u> i.e. Engine speed drops to approx. 900...1200 min ⁻¹ . Then engine speed rises again to approx. 2000 min ⁻¹ and then drops again, and so on.	<u>Component:</u> Control unit
<u>Program switch position</u> "Ω"	15		
<u>Measuring equipment:</u> Motortester			<u>Operation:</u> Cutting off of injection pulses (overrun cutoff)
<u>Measuring range:</u> Engine speed			
<u>Connection:</u> Ignition coil			
<u>Operation in vehicle:</u> Let engine run			<u>Malfunction:</u> No cutoff
<u>Button:</u> Press T5			



- 1 = Control unit
- 2 = Locating lug
- 3 = Detent
- 4 = Mounting hole

Trouble-shooting:

Replace control unit

Note:

To rule out confusion between the control units of the various systems, a mechanical locking system has been introduced. The "lug" (pivot point when opening and connecting the control unit) and the corresponding mount on the control unit have matching recesses and pins.

F7

Test with universal test adapter
Volvo 760 Turbo



F8

Test with universal test adapter
Volvo 760 Turbo



Testing with the Universal test adapter is now completed.
If the fault has not been found or if you require
further information and instructions on how to remedy
the fault, continue with the trouble-shooting program
of your choice.

Detailed trouble-shooting → see B3-B4

Direct trouble-shooting → see B5-B10

F9

Test with universal test adapter

Volvo 760 Turbo



STARTING MOTOR OPERATES, ENGINE FAILS TO START OF STARTS ONLY WITH GREAT DIFFICULTY

Trouble-shooting program according to customer complaints

How to use the following trouble-shooting program

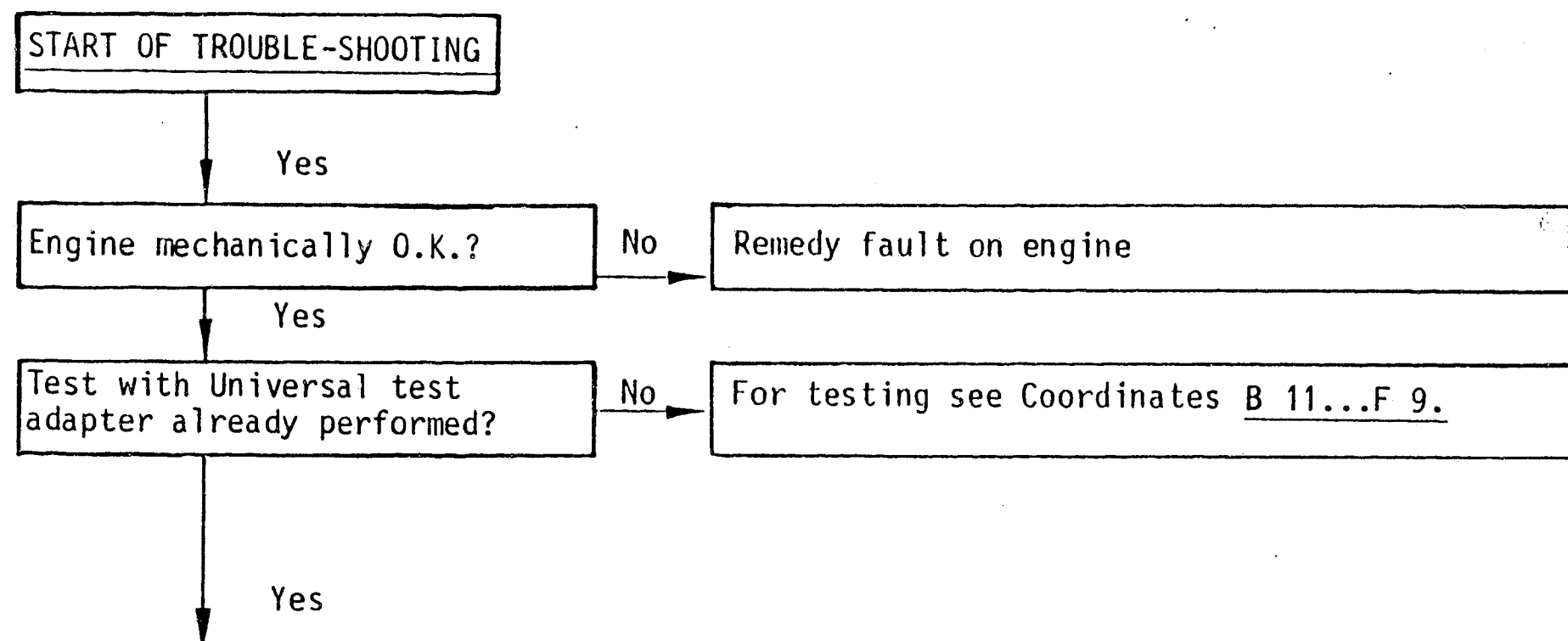
The program is divided into 3 rows of boxes:

1. The left-hand row contains the questions on the tests.
2. The middle row contains descriptions of the testing and adjustment operations on the components.
3. The right-hand row contains the illustrations belonging to the text and explains the illustrations.

If the questions can be answered conclusively with "yes" without testing, proceed to the next question below.

If, on the other hand, the answer to the question is "no", and you suspect a fault, branch to the middle row of boxes and carry out the tests given there.

When you have finished testing continue trouble-shooting at the point at which you branched off.



Continued on F 12/F 13

F10

Engine fails to start
Volvo 760 Turbo



F11

Engine fails to start
Volvo 760 Turbo



Starting motor operates, engine fails to start or starts only with great difficulty

Yes

Check secondary pattern of all cylinders at cranking speed. Secondary pattern O.K.?

No

Check ignition coil and high-voltage distributor. Check distributor cap for dirt and arcing damage. Make sure that the plastic part is installed in the mounting slot of the high-voltage distributor. With this plastic part the high-voltage distributor is correctly adjusted. Note the cylinder numbers when connecting the H.T. cables. Do not forget screening cover. Check ignition coil primary for continuity (approx. $0\ \Omega$). Secondary resistance: 5 to 7.2 k Ω . Test interference-suppression resistors, H.T. ignition cables and spark plugs.

Interference-suppression resistor in	
Distributor rotor:	1 k Ω
Distributor outer dome:	1 k Ω
Distributor center dome:	0 k Ω
Spark-plug connector:	5 k Ω
Ignition coil:	0 k Ω

Yes

Test solenoid-operated injection valves.
• While cranking, feel all injection valves by hand. Can needle movement be felt on all valves?

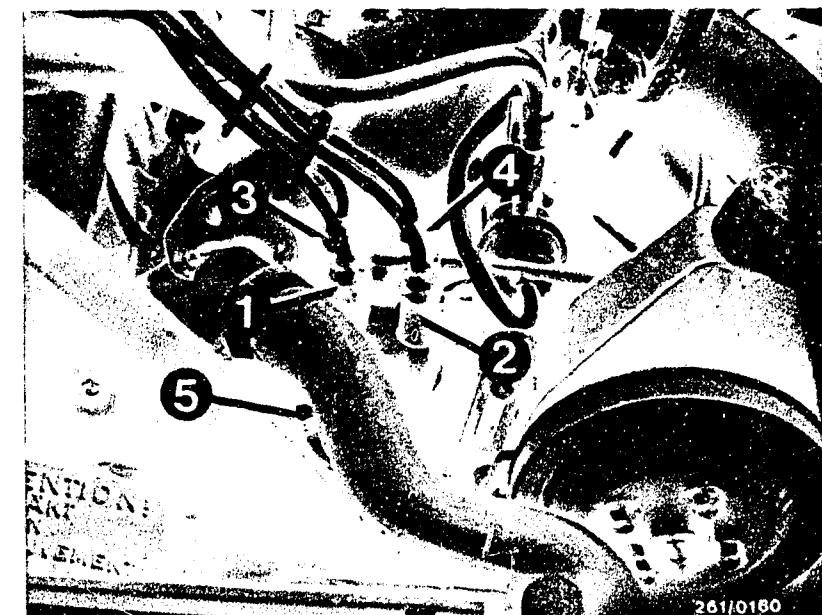
No

Test injection valve with ohmmeter. Test specification: 2 to 3 Ω . Replace injection valve if defective.

Yes

Yes

Continued on F 14/F 15



1 to 4 = Cylinder numbers
5 = Fastening screws

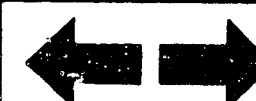
F12

Engine fails to start
Volvo 760 Turbo



F13

Engine fails to start
Volvo 760 Turbo



Starting motor operates, engine fails to start or starts only with great difficulty (continued)

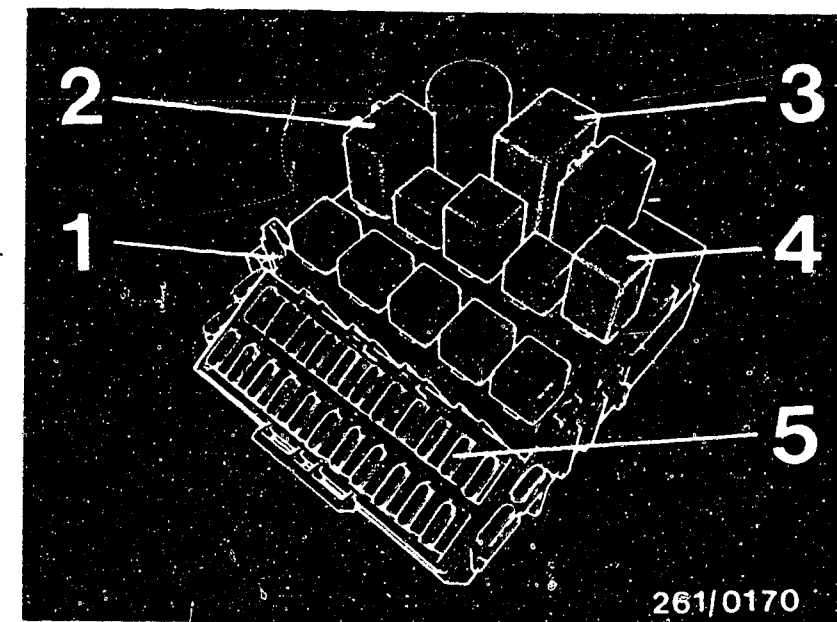
Injection valve of cylinder 2 not clicking:

Time-delay relay for overdrive defective.
Operation of time-delay relay:
If overdrive is selected in 4th gear under load, then the time-delay relay switches off the injection valve of cylinder 2 for 0.3 seconds to reduce the torque and enable smooth, gentle shifting into overdrive.

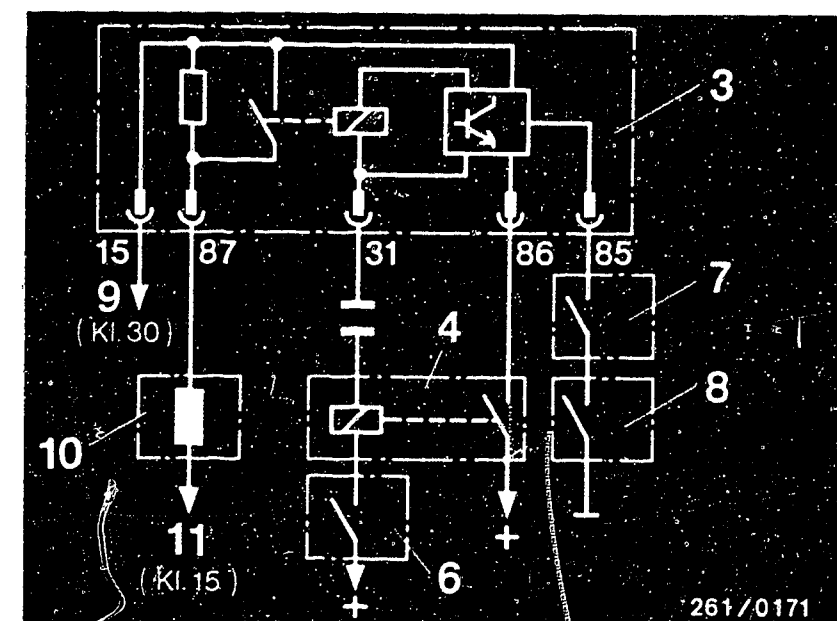
Testing: Disconnect time-delay relay and bridge terminals 15 and 87 in the plug-in base. If the injection valve of relay 2 now operates, replace time-delay relay and test the other components as well as leads according to circuit diagram.

Yes

Continued on F16/F17



- 1 = Central-electrics console
- 2 = Relay set
- 3 = Time-delay relay
- 4 = Relay for overdrive
- 5 = Fuses
- 6 = Switch for overdrive
- 7 = Hydraulic pressure switch on transmission
- 8 = Charge-air pressure switch
- 9 = To relay set
- 10 = Injection valve for cyl. 2
- 11 = To control unit



F14

Engine fails to start
Volvo 760 Turbo



F15

Engine fails to start
Volvo 760 Turbo



Starting motor operates, engine fails to start or starts only with great difficulty
(continued)

Removing the solenoid-operated injection valves

Loosen the fastening screws on the fuel-distribution pipe. Pull the fuel-distribution pipe upward until the injection valves are out of the bore in the intake manifold. Do not damage the nozzle needle or rubber seal.

Check the nozzle needle and surrounding area for leaks and deposits.

Remove the electrical connector.

Carefully slide the holding clamps out of the groove and pull the injection valve out of the fuel distribution pipe connection.

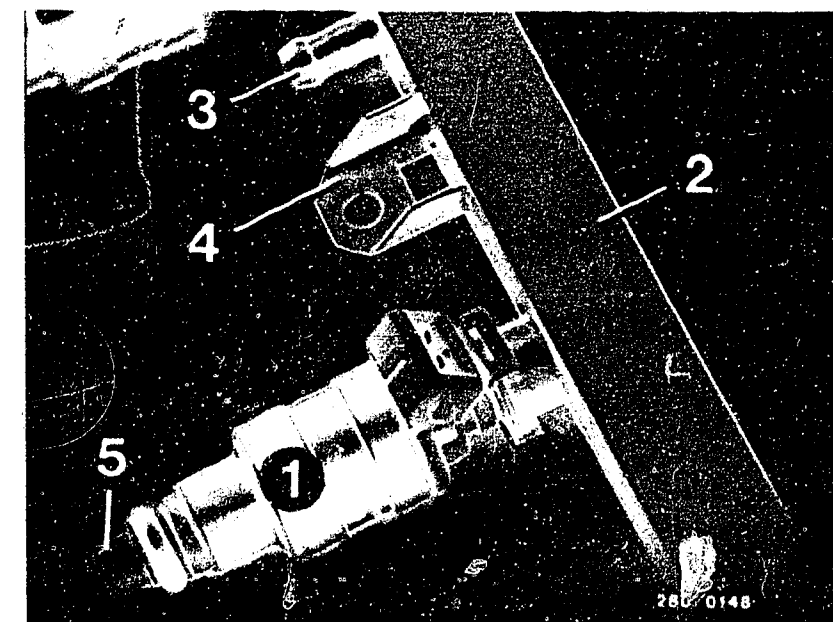
Caution: Catch escaping fuel. Do not allow to drip onto hot parts of the engine.

Installing the injection valves

Replace O-rings if damaged, brittle or swollen. Do not remove protection sleeve. When replacing O-ring for intake port seal, cut O-ring and fit new O-ring over protection sleeve and bead. Do not damage any parts. Use parts set 1 287 010 704. Grease O-rings only lightly with Ft2v2 (Wacker silicone grease 300 medium). The other valve parts must remain free of grease. When working on injection valves, do not damage the nozzle needle.

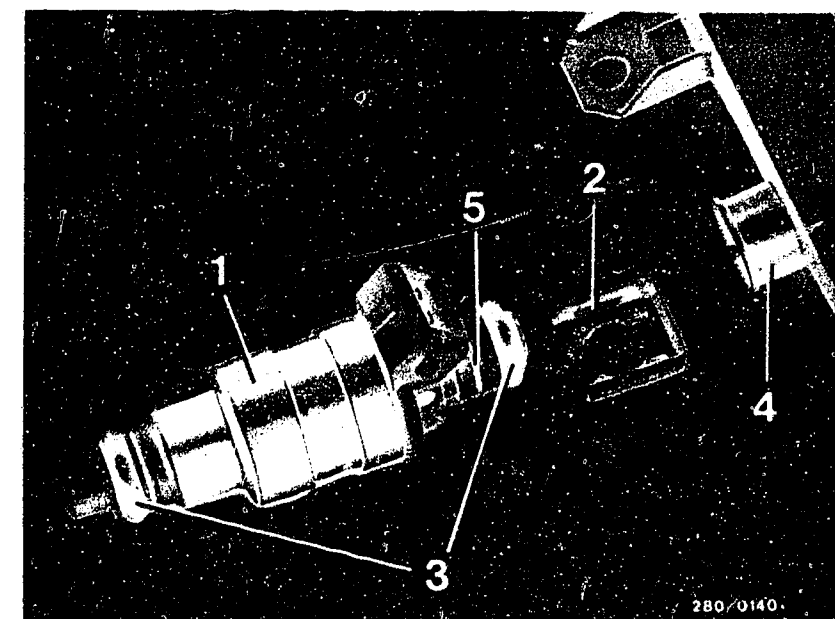
Yes

Continued on F 18/F 19



- 1 = Solenoid-operated injection valve
- 2 = Fuel-distribution pipe
- 3 = Connection to start valve
- 4 = Mounting bracket
- 5 = Protection sleeve

- 1 = Solenoid-operated injection valve
- 2 = Holding clamp
- 3 = Rubber seal
- 4 = Fuel-distribution pipe connection
- 5 = Groove



F16

Engine fails to start
Volvo 760 Turbo



F17

Engine fails to start
Volvo 760 Turbo

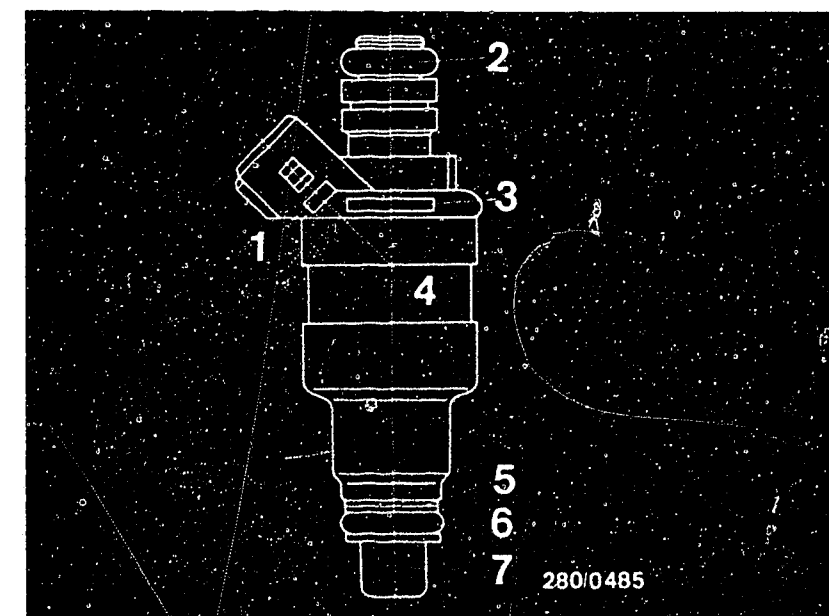


Starting motor operates, engine fails to start or starts only with great difficulty (continued)

Check both rubber seals for correct seating before installing. Press all 4 injection valves uniformly into their seats with the fuel-distribution pipe. Screw down fuel-distribution pipe. Check all air and fuel hoses for correct seating. Make electrical connections.

Start engine and check whether any unmetered air is being drawn in.

Yes



- 1 = FD mark
- 2 = Upper O-ring
- 3 = Part number
- 4 = Injection valve
- 5 = Supporting plate
- 6 = Lower O-ring
- 7 = Protection sleeve

Continued on F20/21

F18

Engine starts but then dies
Volvo 760 Turbo



F19

Engine starts but then dies
Volvo 760 Turbo



Starting motor operates, engine fails to start or starts only with great difficulty
(continued)

Yes

Auxiliary-air device tested?

No

Testing (mechanical):

1. Visual examination of auxiliary-air device:

Remove hoses and look down, using a small mirror. When cold, the device must be open; when the engine is warm, it must be closed. If not, replace auxiliary-air device.

2. Functional test of auxiliary-air device:

With the engine cold, pinch off hose to auxiliary-air device. Engine speed must drop. With the engine warm, pinch off hose to auxiliary-air device. Engine speed must not drop. If incorrect, replace auxiliary-air device (pay attention to direction of flow).

3. Electrical test

Remove plug from auxiliary-air device. Connect ohmmeter to both terminals of the auxiliary-air device.

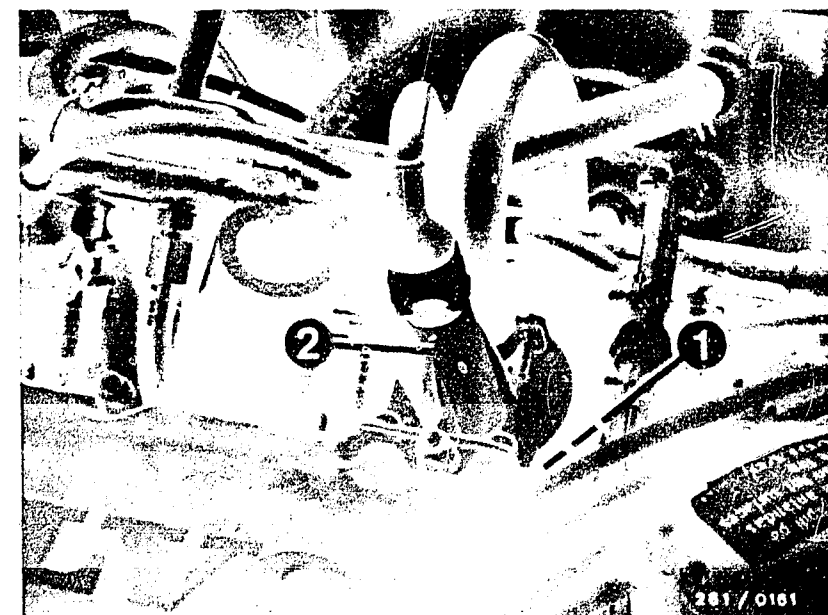
Test values:

40...75 Ω

If a value outside the tolerance is shown, replace the auxiliary-air device.

Yes

Continued on F 22/F 23



1 = Start valve

2 = Auxiliary-air device

F20

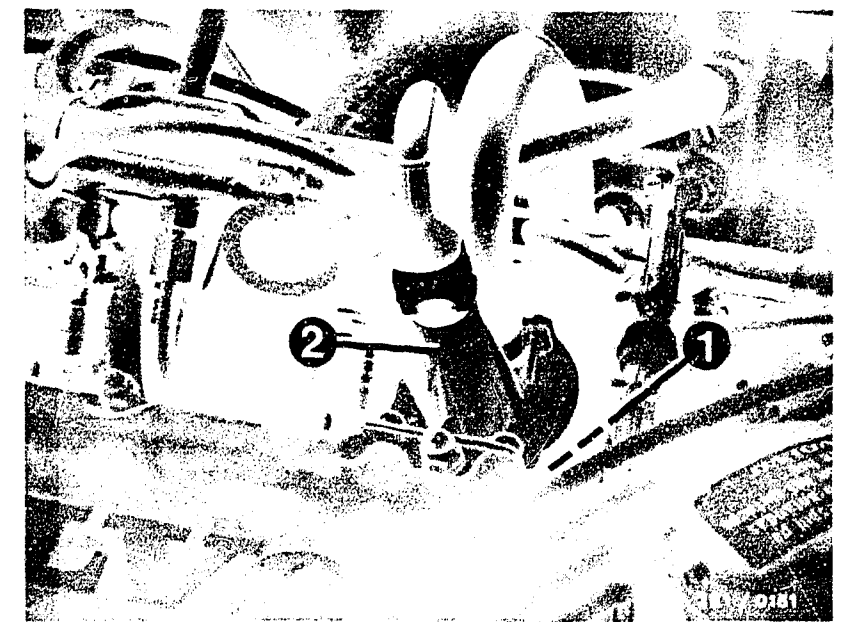
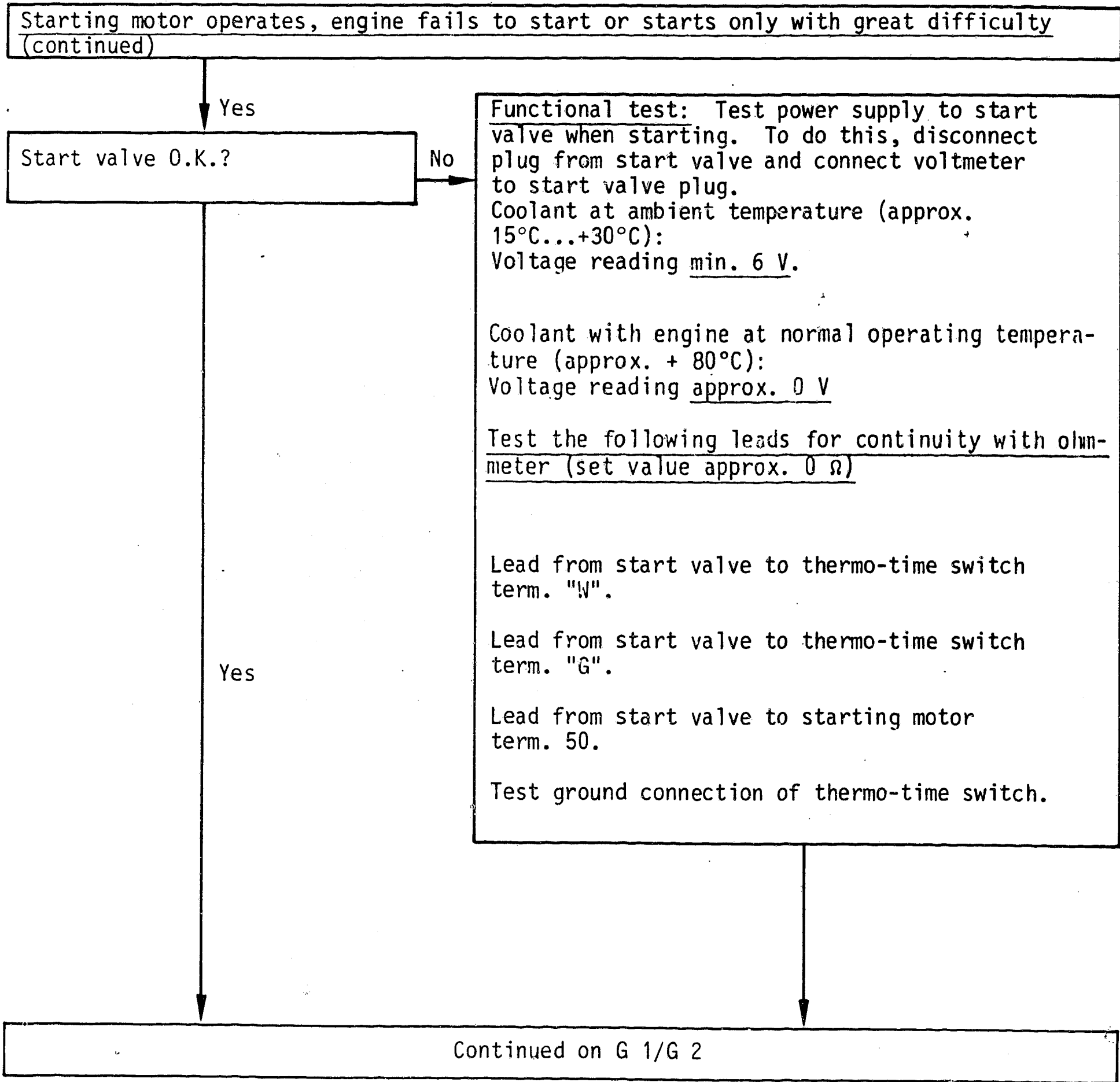
Engine fails to start
Volvo 760 Turbo



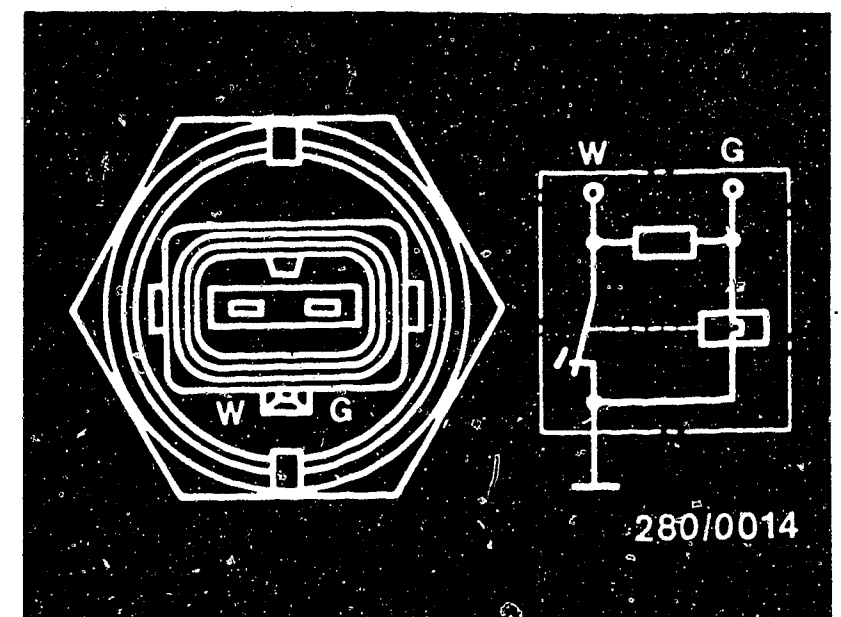
F21

Engine fails to start
Volvo 760 Turbo





1 = Start valve
2 = Auxiliary-air device



F22

Engine fails to start
Volvo 760 Turbo



F23

Engine fails to start
Volvo 760 Turbo



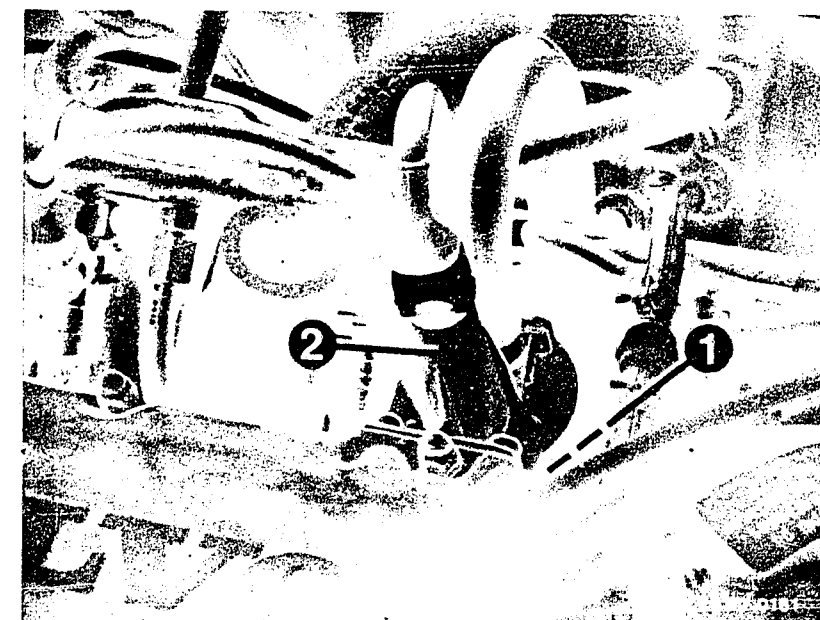
Starting motor operates, engine fails to start or starts only with great difficulty
(Continued)

Electric test of start valve:
Connect ohmmeter to start valve (remove plug):
Set value approx. $4\ \Omega$.
Mechanical test of start valve:
Remove start valve from intake manifold and
hold in a container. (Caution! Fire hazard!).
When starting at temperatures below ambient
temperature (approx. $+15^{\circ}\dots30^{\circ}\text{C}$) the start
valve must squirt (max. 7,5 sec). With the
engine at normal operating temperature (approx.
 $+80^{\circ}\text{C}$) the start valve must not squirt. With
the ignition switched on and the pressure
built up the start valve must likewise not
squirt.

Yes

Yes

Continued on G 3/G 4



1 = Start valve
2 = Auxiliary-air device

G1

Engine fails to start
Volvo 760 Turbo



G2

Engine fails to start
Volvo 760 Turbo



Starting motor operates, engine fails to start or starts only with great difficulty
(Continued)

Carry out squirt test for engine at normal operating temperature (approx. + 80°C) as follows:
Remove plug from thermo-time switch and ground term. W.

Testing the start valve for leaks:

1. When installed

Switch over directional-control valve of pressure gauge so that start valve is disconnected from fuel-distribution pipe.
If engine now runs, replace start valve.

2. When removed

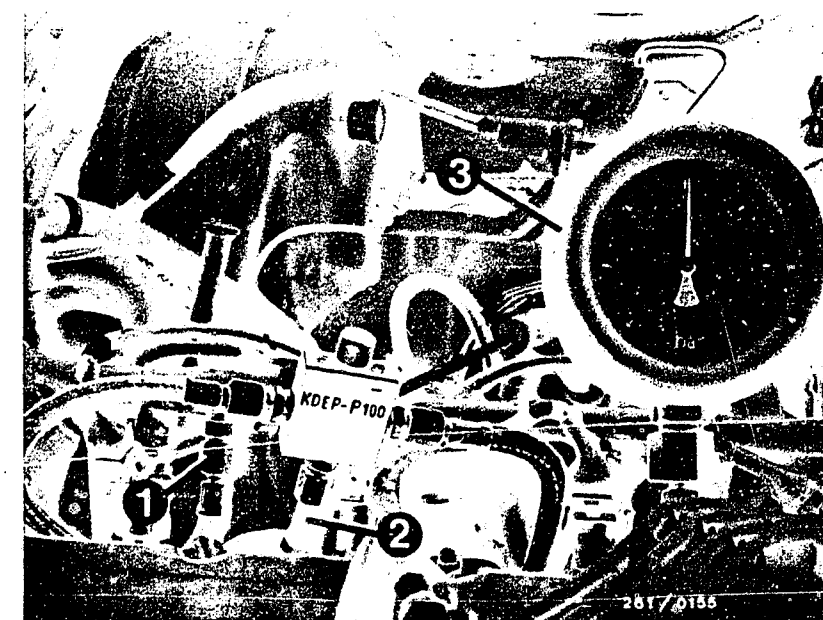
Remove start valve (Caution! Fire hazard!)
Fuel line and electric lead remain connected (place collector vessel under the start valve).

Build up fuel pressure:

On the universal test adapter set the program switch "V" to position 17. Switch on the ignition and press button T 3.

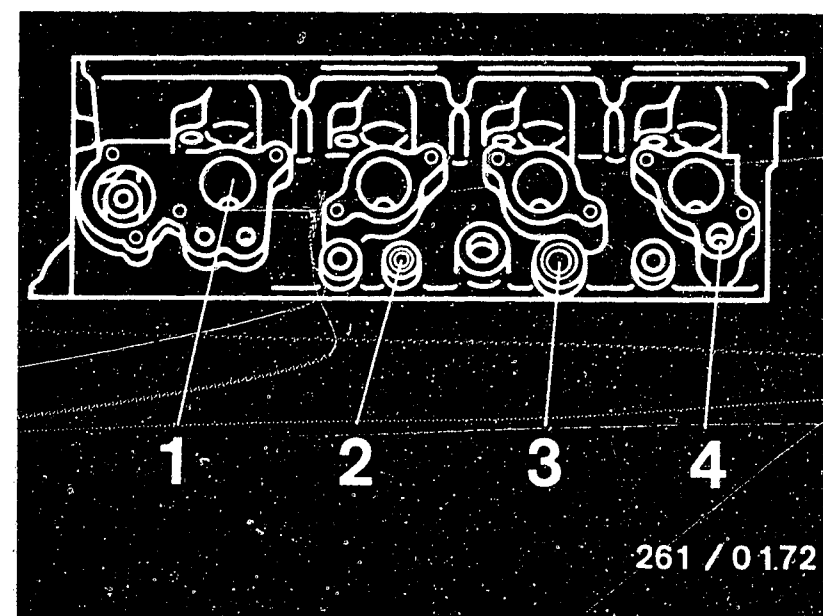
Test specification: Within one minute max. 1 drop may form at the mouth of the valve.

Yes



- 1 = Connection to fuel-distribution pipe
- 2 = Hose to start valve
- 3 = Pressure gauge

- 1 = Cylinder 1 (intake manifold removed)
- 2 = Sensor for indication in instrument panel
- 3 = Engine temperature sensor (NTC II)
- 4 = Thermo-time switch



Continued on G 5/G 6

G3

Engine fails to start
Volvo 760 Turbo



G4

Engine fails to start
Volvo 760 Turbo



Starting motor operates, engine fails to start or starts only with great difficulty
(continued)

Thermo-time switch
O.K.?

Yes

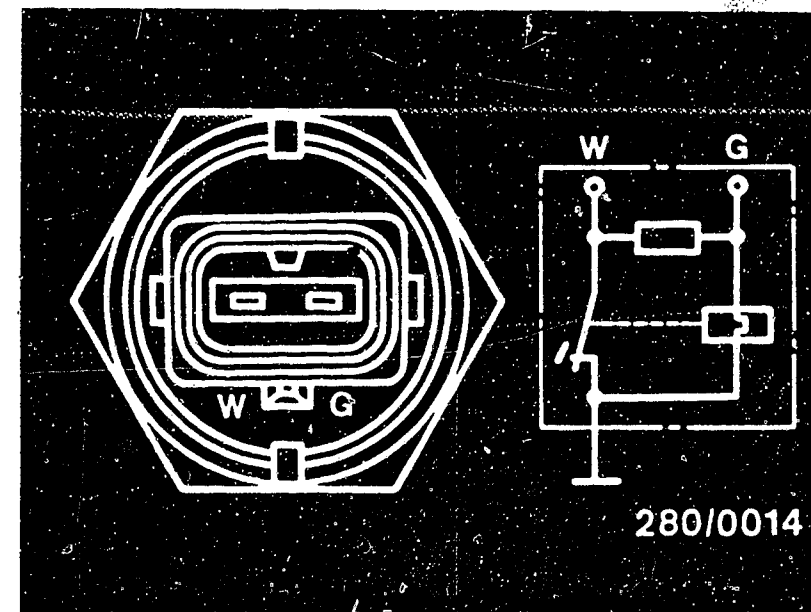
No

Electrical test

Test thermo-time switch 35°/7,5 sec. as follows:
Remove plug and make direct resistance measurement
at thermo-time switch using ohmmeter.

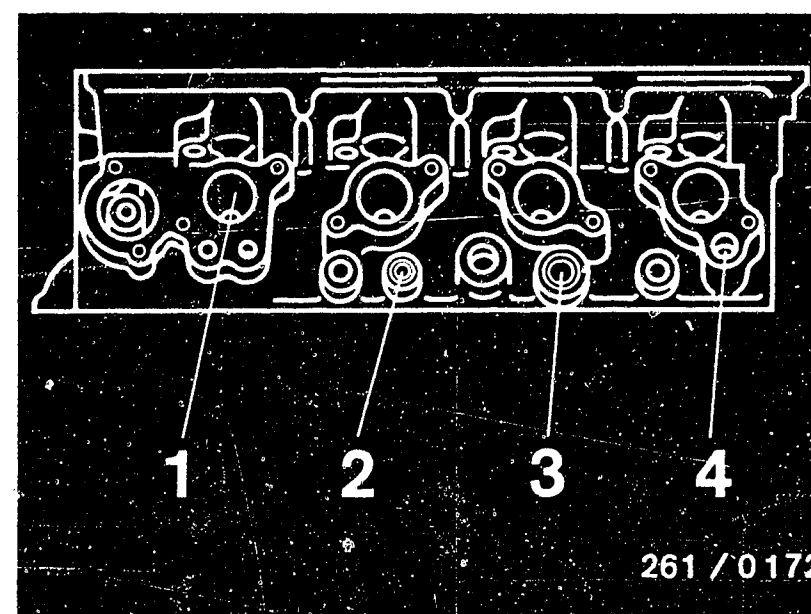
	Between term. "G" + ground	Between term. "W" + ground	Between term. "G" + "W"
Ambient temperature (below 30°C)	25...40 Ω	0 Ω	25...40 Ω
Engine at normal operating temperature (above 40°C)	50...80 Ω	100...160 Ω	50...80 Ω

Continued on G 7/G 8



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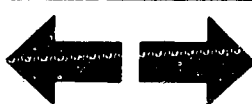
- 1 = Cylinder 1 (intake manifold removed)
- 2 = Sensor for indication in instrument panel
- 3 = Engine temperature sensor (NTC II)
- 4 = Thermo-time switch



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G5

Engine fails to start
Volvo 760 Turbo



G6

Engine fails to start
Volvo 760 Turbo



Starting motor operates, engine fails to start or starts only with great difficulty
(continued)

Yes

Air-flow sensor mechanically
O.K.?

No

Testing: Open air-flow sensor flap by hand. It must be possible to open the air-flow sensor flap with uniform ease from its fully closed position to its fully open position. When released, the flap must close completely by itself. When the air-flow sensor flap is opened it must not catch at any point. Watch for any indications of abrasion or rubbing. Clean air-flow sensor if the inside is very dirty and rub out with a lint-free cloth. If there are any signs of abrasion or rubbing, replace the air-flow sensor.

Yes

Are all hose lines and electric
leads securely attached?
Visual examination.
Is the air-intake system leak-
tight?

No

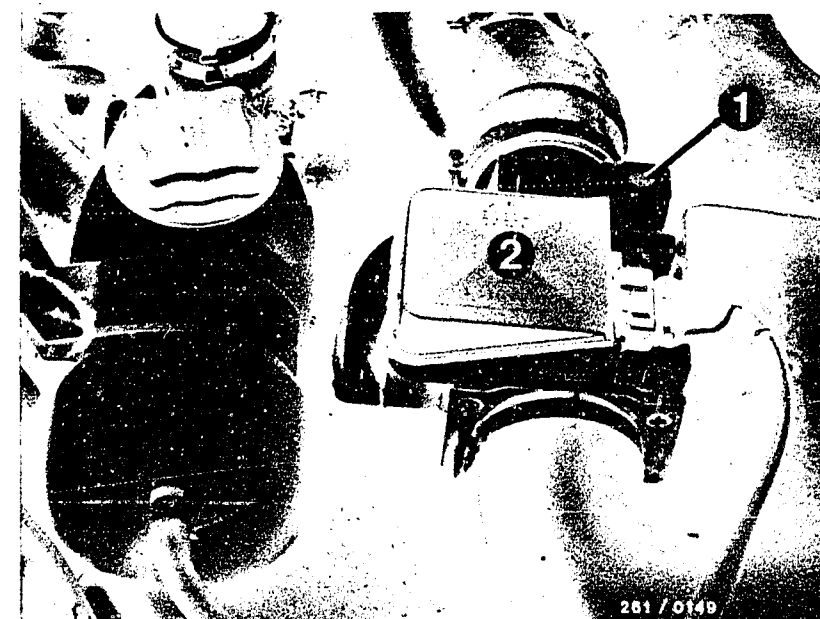
Check whether hoses of air-intake system and of fuel line system are securely attached, not kinked or damaged. If necessary, replace hoses. Eliminate leaks with new seals or by re-tightening the connecting screws.

Leak test:

Seal off exhaust tail pipe. Unscrew top part of air filter on air-flow sensor and seal off air-flow sensor duct. Remove hose after auxiliary-air device and using compressed-air gun blow air (0.3 bar gauge pressure) into intake manifold. Seal off connection port on auxiliary-air device. Open throttle valve fully while doing this. Brush or spray all joints with soapy water. Bubbling or foaming indicates a leak. Check electrical plug-in contacts for loose contact.

Yes

Continued on G 9/G 10



1 = Idle-mixture-adjusting screw
2 = Air-flow sensor with
NTC I

G7

Engine fails to start
Volvo 760 Turbo



G8

Engine fails to start
Volvo 760 Turbo



Starting motor operates, engine fails to start or starts only with great difficulty
(continued)

Yes

Testing completed for customer complaint

"Starting motor operates, engine fails to start or starts only with great difficulty",

Customer complaint remedied?

No

Further possibilities

- Customer complaint incorrectly diagnosed (see Coordinates B3...B10). If the fault has not be detected by "direct trouble-shooting", see "detailed trouble-shooting" (Coordinates B3/B4).
- Engine not mechanically O.K. (Compression, valve setting, valve timing, worn camshaft).

G9

Engine fails to start
Volvo 760 Turbo



G10

Engine fails to start
Volvo 760 Turbo



ENGINE STARTS BUT THEN DIES

Trouble-shooting program according to customer complaints

How to use the following trouble-shooting program

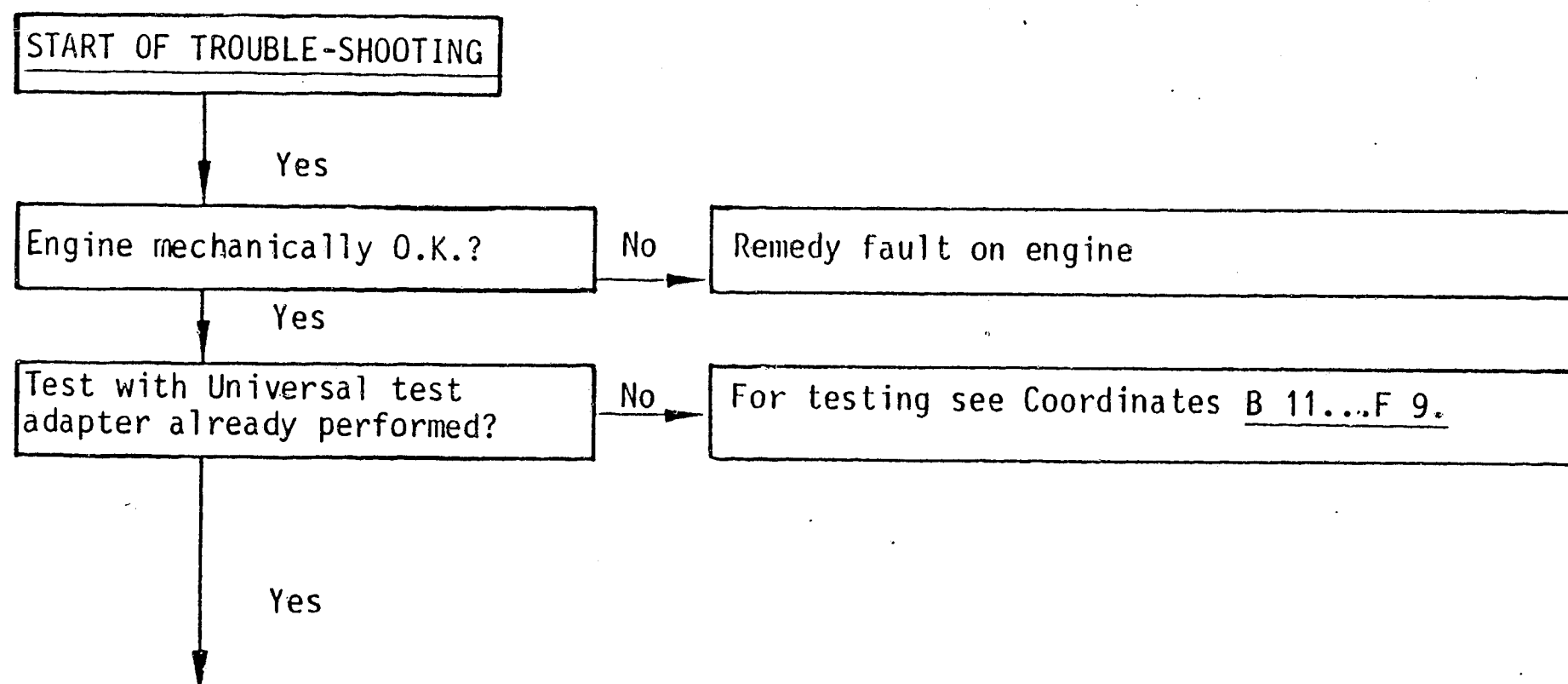
The program is divided into 3 rows of boxes:

1. The left-hand row contains the questions on the tests.
2. The middle row contains descriptions of the testing and adjustment operations on the components.
3. The right-hand row contains the illustrations belonging to the text and explains the illustrations.

If the questions can be answered conclusively with "yes" without testing, proceed to the next question below.

If, on the other hand, the answer to the question is "no", and you suspect a fault, branch to the middle row of boxes and carry out the tests given there.

When you have finished testing continue trouble-shooting at the point at which you branched off.



Continued on G 13/G 14

G 11

Engine fails to start
Volvo 760 Turbo



G 12

Engine fails to start
Volvo 760 Turbo



Engine starts but then dies (continued)

Yes

Are all hose lines and electric leads securely attached?
Visual examination.
Is the air-intake system leak-tight?

no

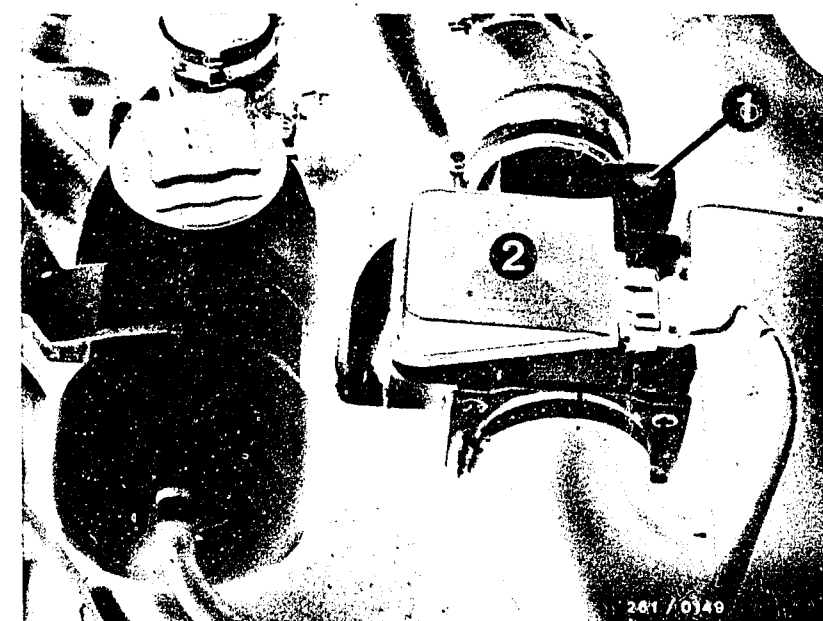
Check whether hoses of air-intake system and of fuel line system are securely attached, not kinked or damaged. If necessary, replace hoses. Eliminate leaks with new seals or by re-tightening the connecting screws.

Leak test:

Seal off exhaust tail pipe. Unscrew top part of air filter on air-flow sensor and seal off air-flow sensor duct. Remove hose after auxiliary-air device and using compressed-air gun blow air (0.3 bar gauge pressure) into intake manifold. Seal off connection port on auxiliary-air device. Open throttle valve fully while doing this. Brush or spray all joints with soapy water. Bubbling or foaming indicates a leak. Check electrical plug-in contacts for loose contact.

Yes

Continued on G 15/G 16



1 = Idle-mixture-adjusting screw

2 = Air-flow sensor

G 13

Engine starts but then dies
Volvo 760 Turbo



G 14

Engine starts but then dies
Volvo 760 Turbo



Engine starts but then dies (continued)

Yes

Auxiliary-air device
tested?

No

Testing (mechanical):

1. Visual examination of auxiliary-air device

Remove hoses and look down, using a small mirror. When cold, the device must be open; when the engine is warm, it must be closed. If not, replace auxiliary-air device.

2. Functional test of auxiliary-air device

When engine is cold, disconnect hose to auxiliary-air device. Engine speed must drop.

When engine is warm, disconnect hose to auxiliary-air device. Engine speed must not drop.

If not replace auxiliary-air device (observe direction of flow).

3. Electrical test

Disconnect plug of auxiliary-air device. Connect ohmmeter to both terminals of the auxiliary-air device.

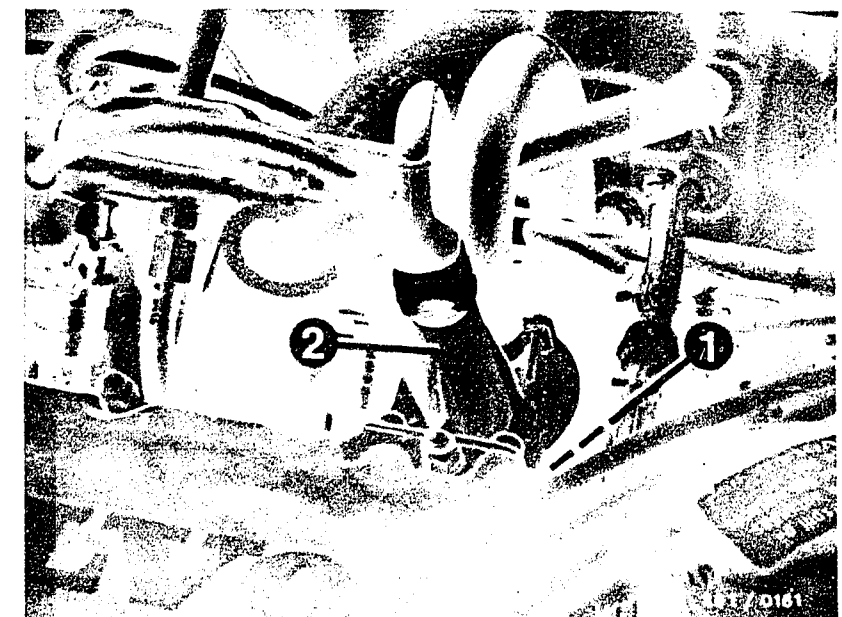
Test value

40...75 Ω

If a value outside tolerance is shown, replace auxiliary-air device.

Yes

Continued on G 17/G 18



1 = Start valve

2 = Auxiliary-air device

G 15

Engine starts but then dies

Volvo 760 Turbo



G 16

Engine starts but then dies

Volvo 760 Turbo



Engine starts but then dies (Continued)

Start valve O.K.?
(Leak test)

No

Testing the start valve for leaks:

1. When installed

Pinch off the fuel delivery line to the start valve. If engine then runs smoothly, replace start valve.

2. When removed

Remove start valve (caution - fire hazard). Fuel line and electric lead remain connected (place collector vessel under start valve).

Build up fuel pressure:

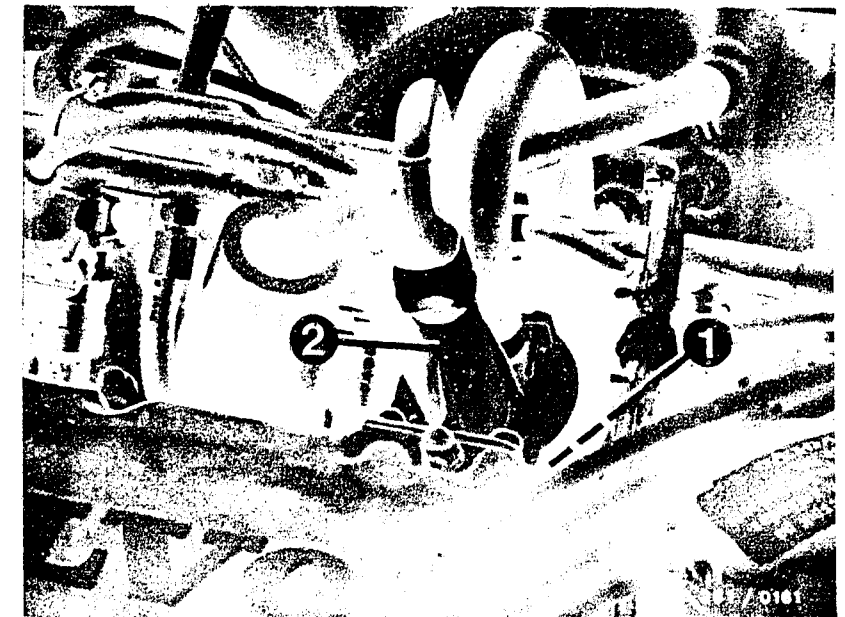
On universal test adapter set program switch "V" to position 17.

Switch on ignition and press button T 3.

Test specification: Within one minute max. 1 drop may form at the mouth of the valve.

Yes

Continued on G 19/G 20



1 = Start valve
2 = Auxiliary-air device

G17

Engine starts but then dies
Volvo 760 Turbo



G18

Engine starts but then dies
Volvo 760 Turbo



Engine starts but then dies (continued)

Thermo-time switch
O.K.?

No

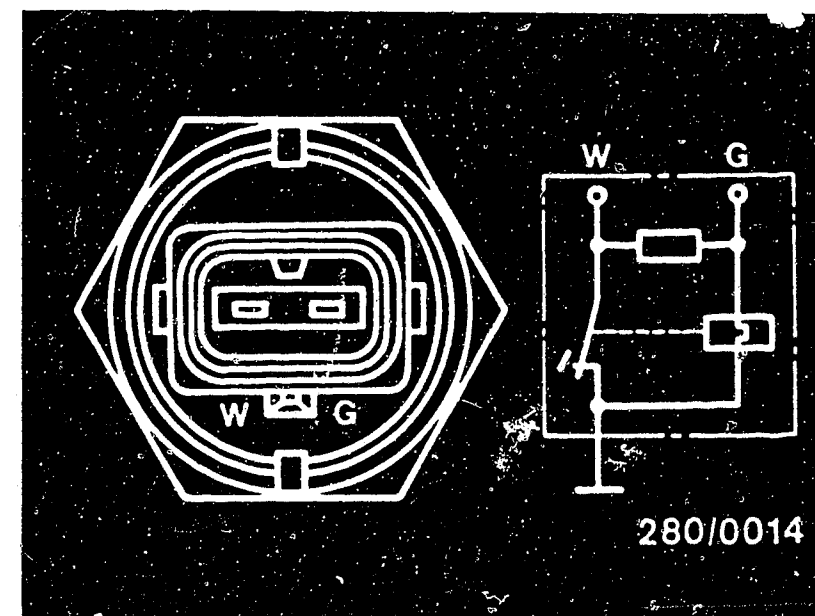
Electrical test

Test thermo-time switch 35°/7,5 sec. as follows:
Remove plug and make direct resistance measurement
at thermo-time switch using ohmmeter.

	Between term. "G" + ground	Between term. "W" + ground	Between term. "G" + "W"
Ambient temperature (below 30°C)	25...40 Ω	0 Ω	25...40 Ω
Engine at normal operating temperature (above 40°C)	50...80 Ω	100...160 Ω	50...80 Ω

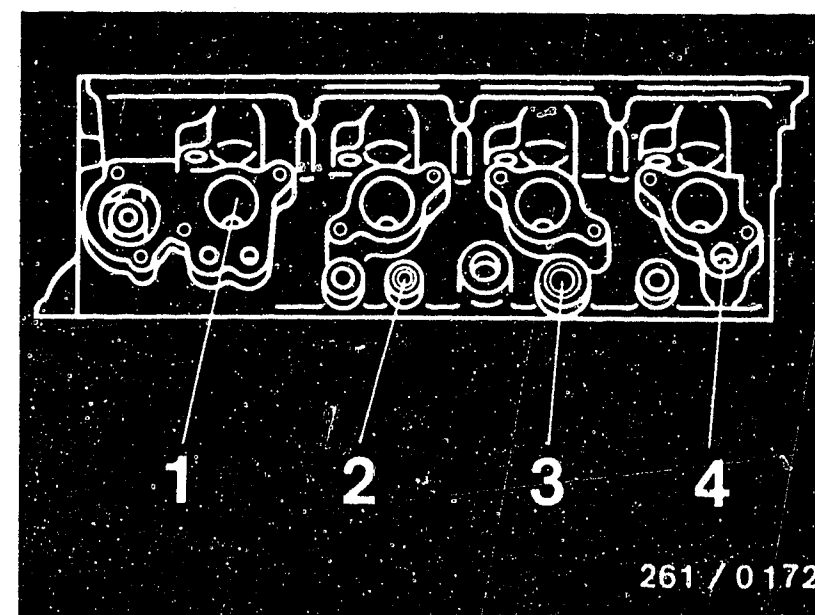
Yes

Continued on G 21/G 22



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- 1 = Cylinder 1 (intake manifold removed)
- 2 = Sensor for indication in instrument panel
- 3 = Engine temperature sensor (NTC II)
- 4 = Thermo-time switch



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G 19

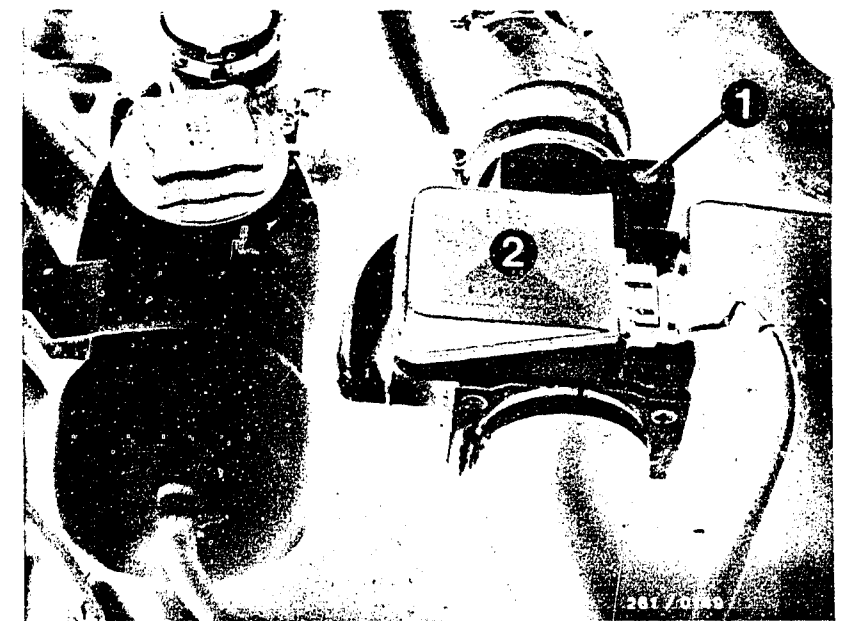
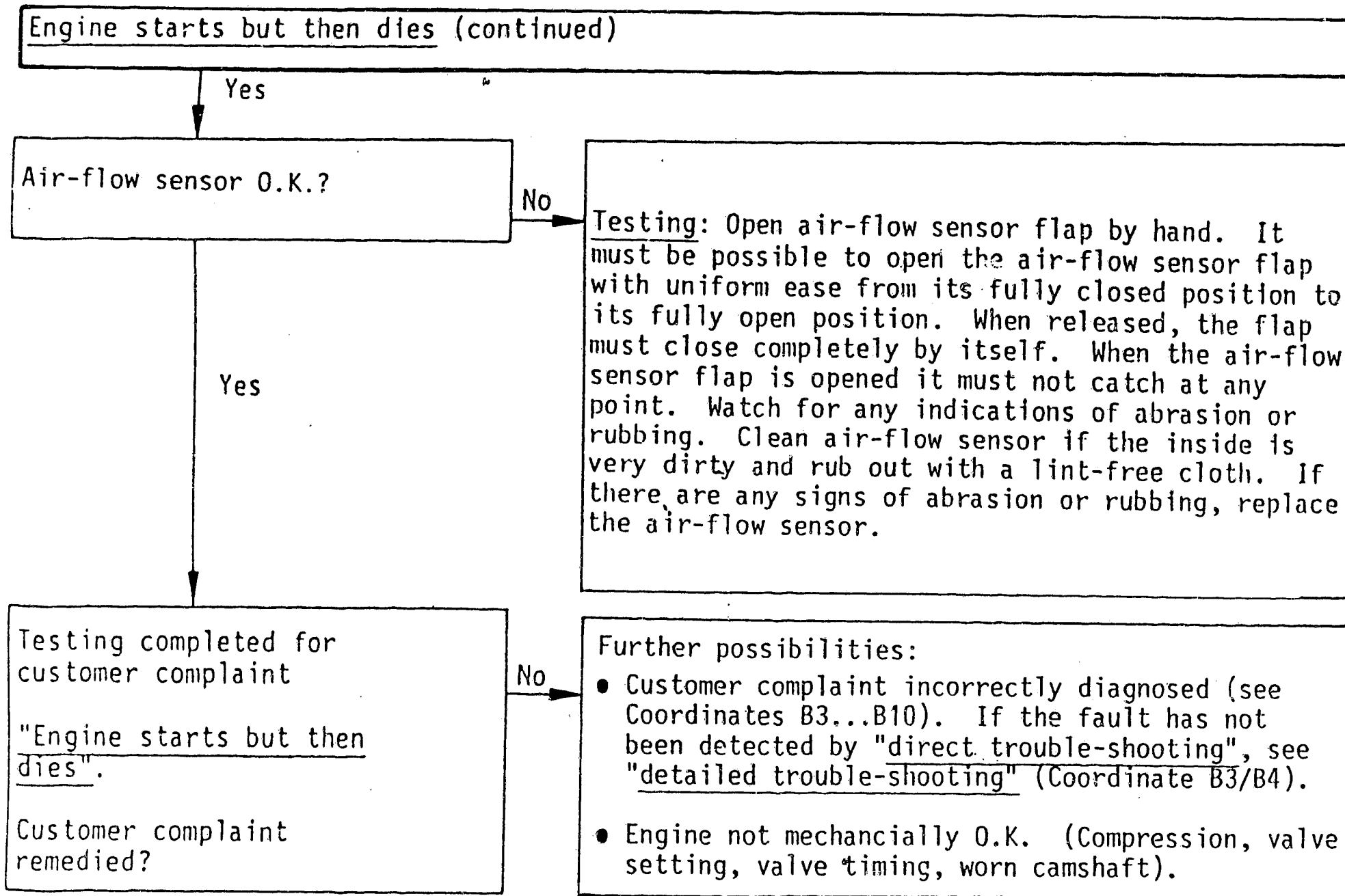
Engine starts but then dies
Volvo 750 Turbo



G 20

Engine starts but then dies
Volvo 760 Turbo





1 = Idle-mixture-adjusting screw
2 = Air-flow sensor with NTC I

UNEVEN ENGINE IDLE, SPEED ADJUSTMENT (IDLE) AND EXHAUST-GAS ADJUSTMENT (continued)

Trouble-shooting program according to customer complaints

How to use the following trouble-shooting program

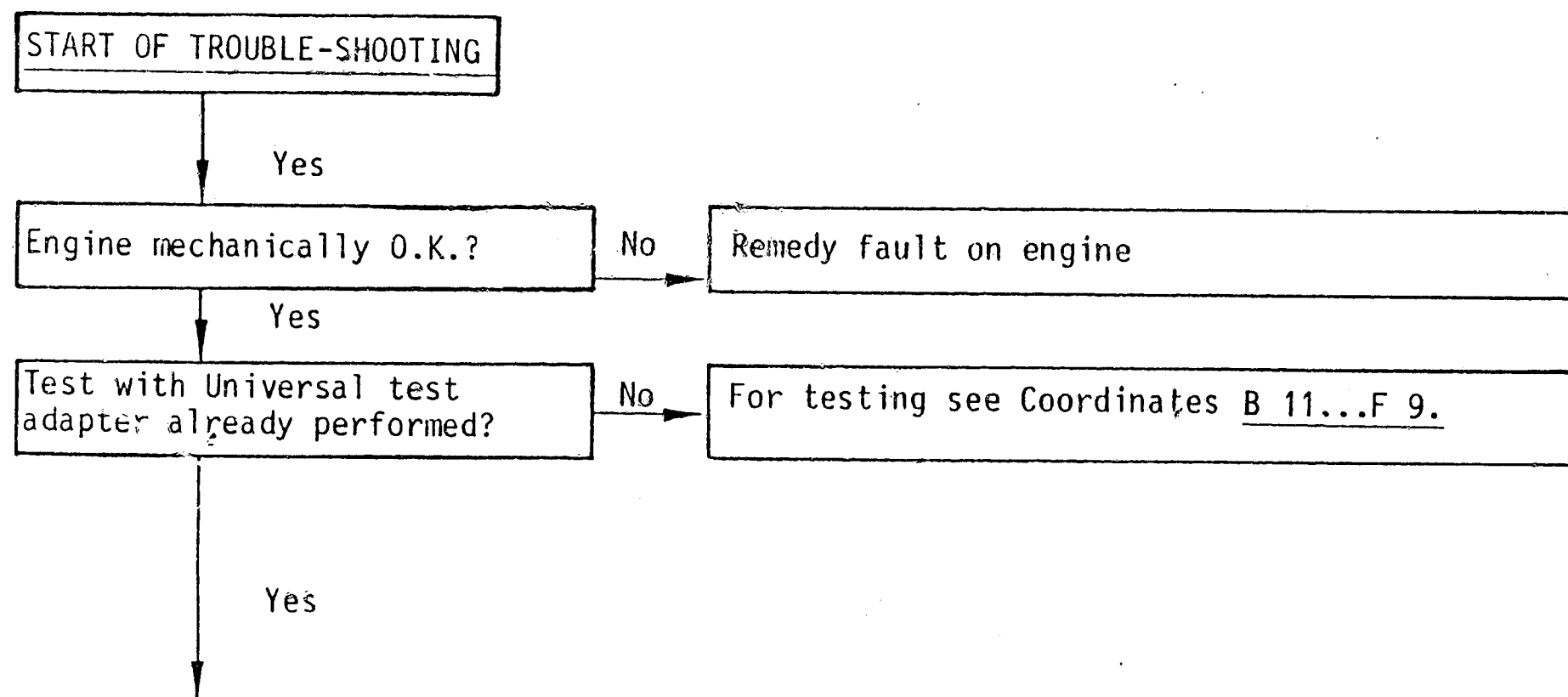
The program is divided into 3 rows of boxes:

1. The left-hand row contains the questions on the tests.
2. The middle row contains descriptions of the testing and adjustment operations on the components.
3. The right-hand row contains the illustrations belonging to the text and explains the illustrations.

If the questions can be answered conclusively with "yes" without testing, proceed to the next question below.

If, on the other hand, the answer to the question is "no", and you suspect a fault, branch to the middle row of boxes and carry out the tests given there.

When you have finished testing continue trouble-shooting at the point at which you branched off.



Continued on H 3/H 4

H1

Uneven engine idle
Volvo 760 Turbo



H2

Uneven engine idle
Volvo 760 Turbo



Uneven engine idle, speed adjustment (idle) and exhaust-gas adjustment (continued)

Yes

Check secondary pattern of all cylinders at cranking speed. Secondary pattern O.K.?

No

Check ignition coil and high-voltage distributor. Check distributor cap for dirt and arcing damage. Make sure that the plastic part is installed in the mounting slot of the high-voltage distributor. With this plastic part the high-voltage distributor is correctly adjusted. Note the cylinder numbers when connecting the H.T. cables. Do not forget screening cover. Check ignition coil primary for continuity (approx. 0 Ω). Secondary resistance: 5 to 7.2 k Ω . Test interference-suppression resistors, H.T. ignition cables and spark plugs.

Interference-suppression resistor in

Distributor rotor: 1 k Ω

Distributor outer dome: 1 k Ω

Distributor center dome: 0 k Ω

Spark-plug connector: 5 k Ω

Ignition coil: 0 k Ω

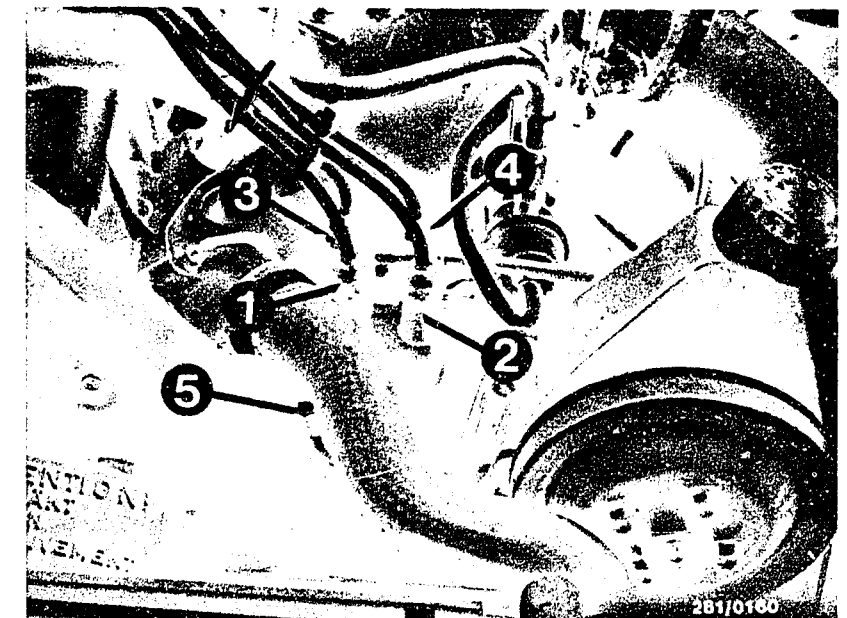
Yes

Air-flow sensor O.K.?

No

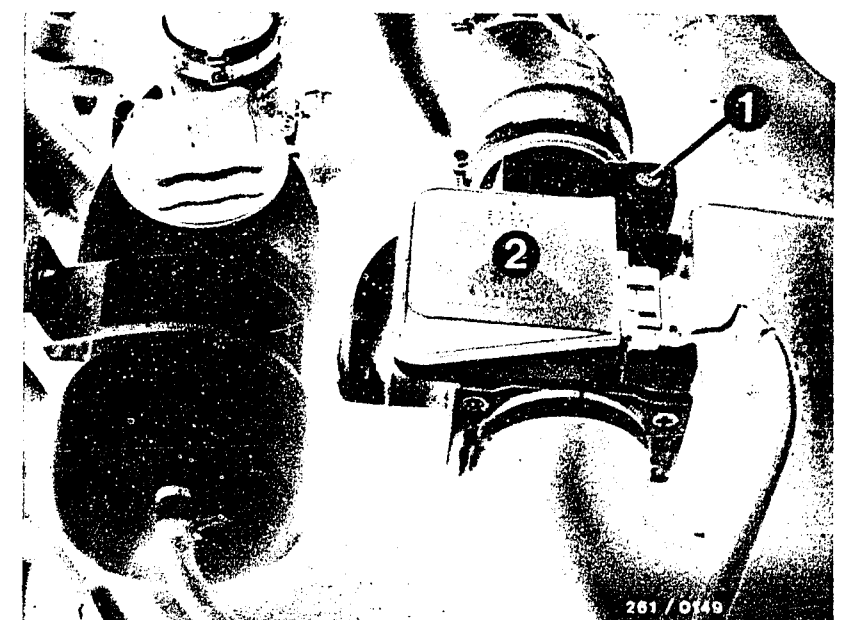
Testing: Open air-flow sensor flap by hand. It must be possible to open the air-flow sensor flap with uniform ease from its fully closed position to its fully open position. When released, the flap must close completely by itself. When the air-flow sensor flap is opened it must not catch at any point. Watch for any indications of abrasion or rubbing. Clean air-flow sensor if the inside is very dirty and rub out with a lint-free cloth. If there are any signs of abrasion or rubbing, replace the air-flow sensor.

Continued on H 5/G 6



1 to 4 = cylinder numbers
5 = Fastening screws

1 = Idle-mixture-adjusting screw
2 = Air-flow sensor



H3

Uneven engine idle
Volvo 760 Turbo



H4

Uneven engine idle
Volvo 760 Turbo



Uneven engine idle, speed adjustment (idle) and exhaust-gas adjustment (continued)

Yes

Are all hose lines and electric leads securely attached?

Visual examination.
Is the air-intake system leak-tight?

No

Check whether hoses of air-intake system and of fuel line system are securely attached, not kinked or damaged. If necessary, replace hoses. Eliminate leaks with new seals or by re-tightening the connecting screws.

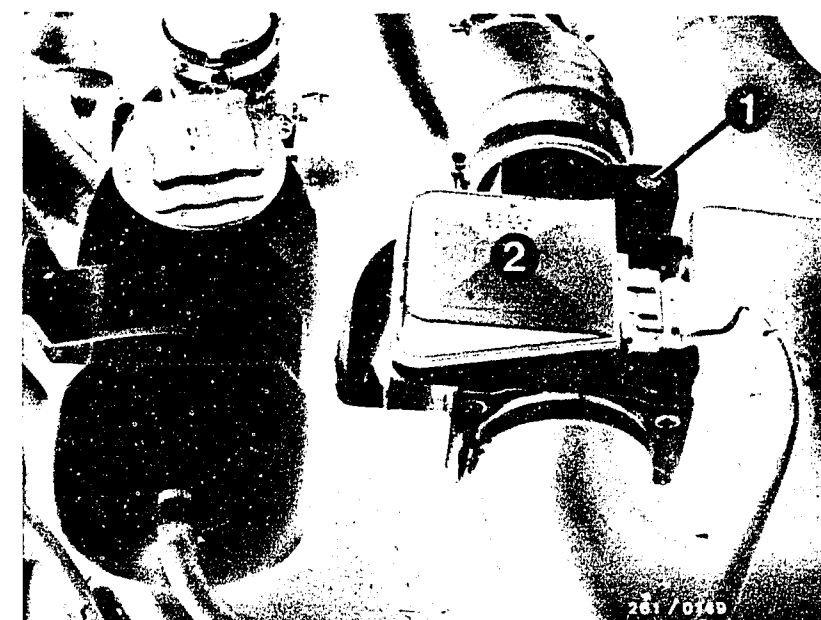
Leak test:

Seal off exhaust tail pipe. Unscrew top part of air filter on air-flow sensor and seal off air-flow sensor duct. Remove hose after auxiliary-air device and using compressed-air gun blow air (0.3 bar gauge pressure) into intake manifold. Seal off connection port on auxiliary-air device. Open throttle valve fully while doing this. Brush or spray all joints with soapy water. Bubbling or foaming indicates a leak.

Check electrical plug-in contacts for loose contact.

Yes

Continued on H 7/H 8



1 = Idle-mixture-adjusting screw
2 = Air-flow sensor with NTC I

H5

Uneven engine idle
Volvo 760 Turbo



H6

Uneven engine idle
Volvo 760 Turbo



Uneven engine idle, speed adjustment (idle) and exhaust-gas adjustment (continued)

Yes

Auxiliary-air device
tested?

No

Testing (mechanical):

1. Visual examination of auxiliary-air device:
Remove hoses and look down, using a small mirror. When cold, the device must be open when the engine is warm, it must be closed. If not, replace auxiliary-air device.

2. Functional test of auxiliary-air device:
With the engine cold, pinch off hose to auxiliary-air device. Engine speed must drop. With the engine warm, pinch off hose to auxiliary-air device. Engine speed must not drop. If incorrect, replace auxiliary-air device (pay attention to direction of flow).

3. Electrical test
Disconnect plug of auxiliary-air device. Connect ohmmeter to both terminals of the auxiliary-air device.

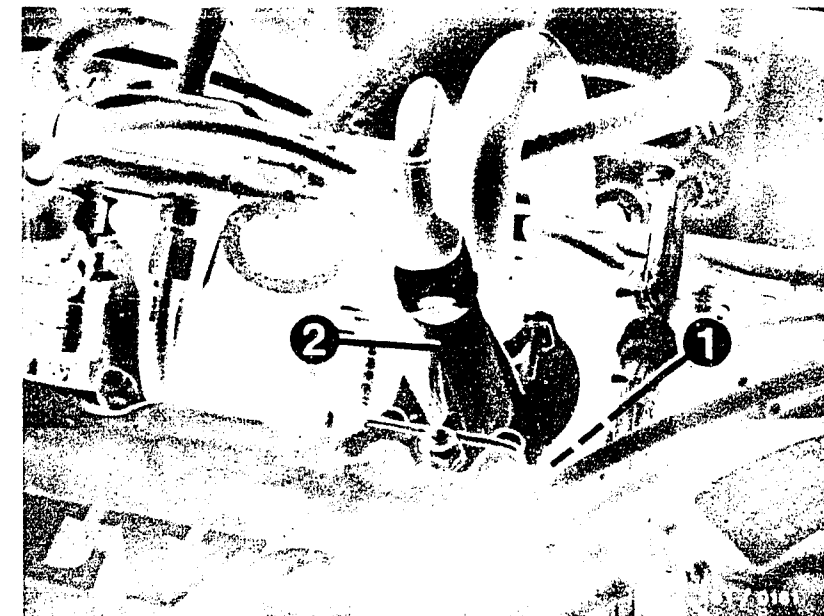
Test value

40...75 Ω

If a value outside the tolerance is shown, replace the auxiliary-air device.

Yes

Continued on H 9/H 10



1 = Start valve

2 = Auxiliary-air device

H7

Uneven engine idle

Volvo 760 Turbo



H8

Uneven engine idle

Volvo 760 Turbo



Uneven engine idle, speed adjustment (idle) and exhaust-gas adjustment (continued)

Thermo-time switch O.K.?

No

Electrical test

Test thermo-time switch 35°/7,5 sec. as follows:
Remove plug and make direct resistance measurement
at thermo-time switch using ohmmeter.

	Between term. "G" + ground	Between term. "W" + ground	Between term. "G" + "W"
Ambient temperature (below 30°C)	25...40 Ω	0 Ω	25...40 Ω
Engine at normal operating temperature (above 40°C)	50...80 Ω	100...160 Ω	50...80 Ω

Yes

Start valve O.K.?

No

Checking the start valve for leaks:

1. When installed

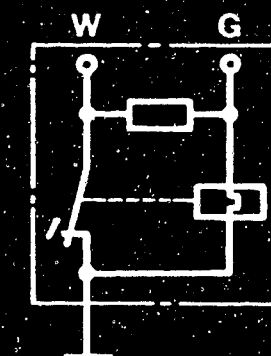
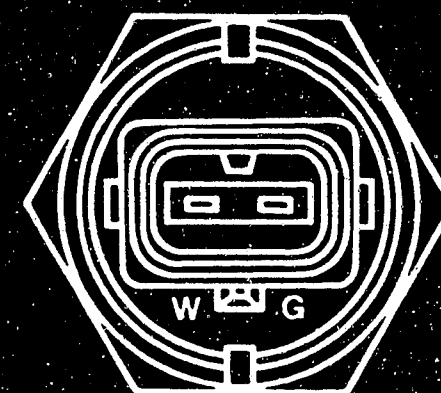
Pinch off fuel delivery line to start valve. If
engine then runs smoothly, replace start valve.

2. When removed

Remove start valve (caution - fire hazard!). Fuel
line and electric lead remain connected (place
collector vessel under start valve). Build up
fuel pressure. On universal test adapter, set
program switch "V" to position 17. Switch on
ignition and press button T 3.

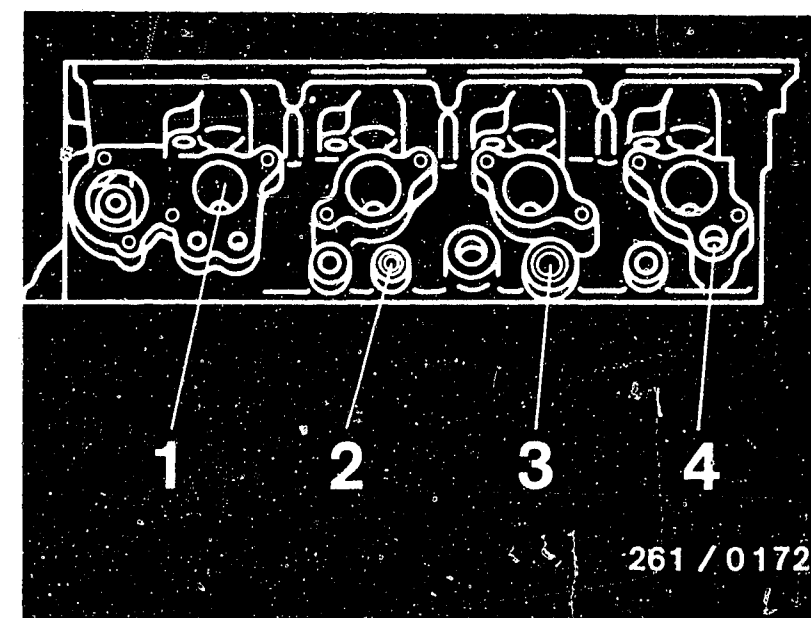
Yes

Continued on H 11/H 12



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- 1 = Cylinder 1 (intake manifold removed)
- 2 = Sensor for indication in instrument panel
- 3 = Engine temperature sensor (NTC II)
- 4 = Thermo-time switch



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H9

Uneven engine idle

Volvo 760 Turbo



H10

Uneven engine idle

Volvo 760 Turbo



Uneven engine idle, speed adjustment (idle) and exhaust-gas test (continued)

Yes

Time-delay relay O.K.?
(Injection valve of
cylinder 2 not
clicking)

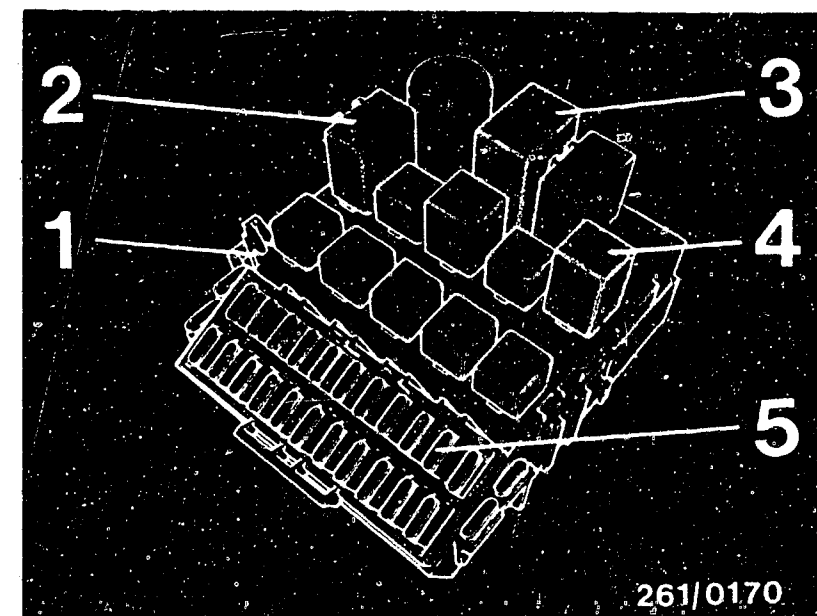
No

Operation of time-delay relay:
If overdrive is selected in 4th gear under load,
then the time-delay relay switches off the
injection valve of cylinder 2 for 0.3 seconds to
reduce the torque and enable smooth, gentle
shifting into overdrive.

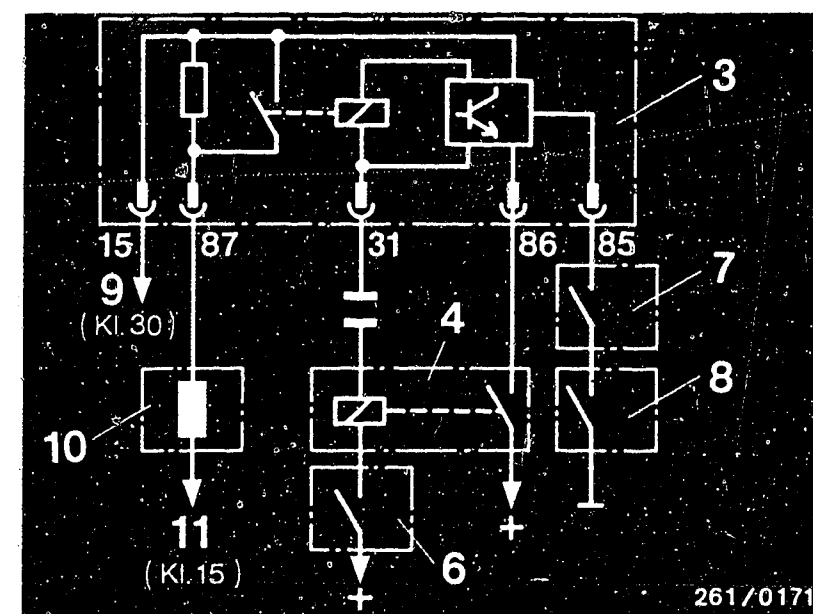
Testing: Disconnect time-delay relay and bridge
terminals 15 and 87 in the plug-in base. If the
injection valve of relay 2 now operates, replace
time-delay relay and test the other components
as well as leads according to circuit diagram.

Yes

Continued on H 13/H 14



- 1 = Central-electrics console
- 2 = Relay set
- 3 = Time-delay relay
- 4 = Relay for overdrive
- 5 = Fuses
- 6 = Switch for overdrive
- 7 = Hydraulic pressure switch on transmission
- 8 = Charge-air pressure switch
- 9 = To relay set
- 10 = Injection valve for cyl. 2
- 11 = To control unit



H11

Uneven engine idle
Volvo 760 Turbo



H12

Uneven engine idle
Volvo 760 Turbo



Uneven engine idle, speed adjustment (idle) and exhaust-gas adjustment (continued)

Yes

Injection valve
mechanically O.K.?

No

With engine running, disconnect injection-valve connectors individually, one after the other, from the injection valves and plug on again. Engine speed must drop if injection valve O.K. . If not, replace injection valve.

Removing the injection valves

Loosen fastening screws on fuel-distribution pipe. Pull fuel-distribution pipe upward until the injection valves are out of the holes in the intake manifold. Do not damage nozzle needle or rubber seals. Check nozzle needle and surroundings for leaks and deposits. Disconnect electrical connector. Carefully slide holding clamps out of groove and withdraw injection valve out of fuel-distribution pipe connection port.

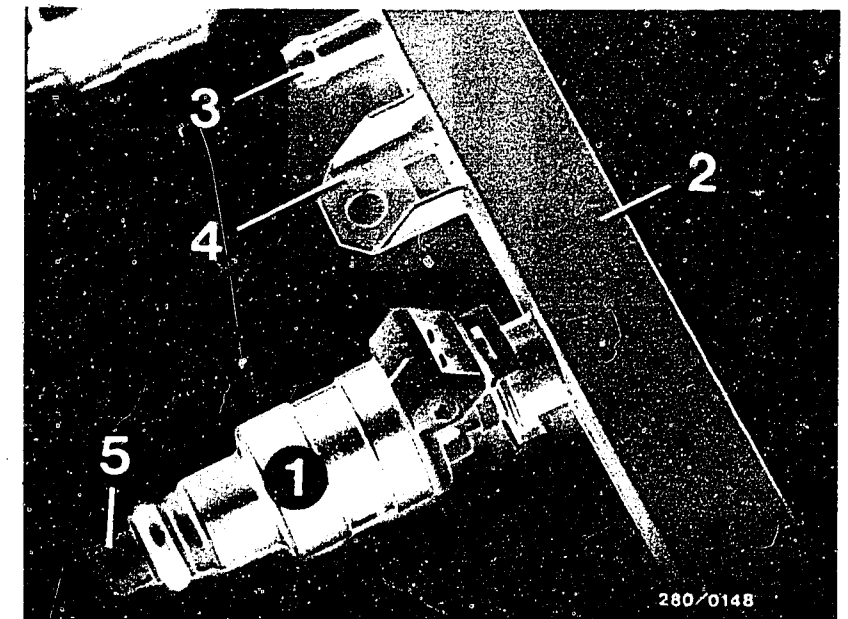
Caution! Catch escaping fuel. Do not allow to drip onto hot parts of the engine.

Installing the injection valves

Replace O-rings if damaged, brittle or swollen. Do not remove protection sleeve. When replacing O-ring for intake port seal, cut O-ring and fit new O-ring over protection sleeve and bead. Do not damage any parts. Use parts set 1 287 010 704. Grease O-rings only lightly with Ft2v2 (Wacker silicone grease 300 medium). The other valve parts must remain free of grease.

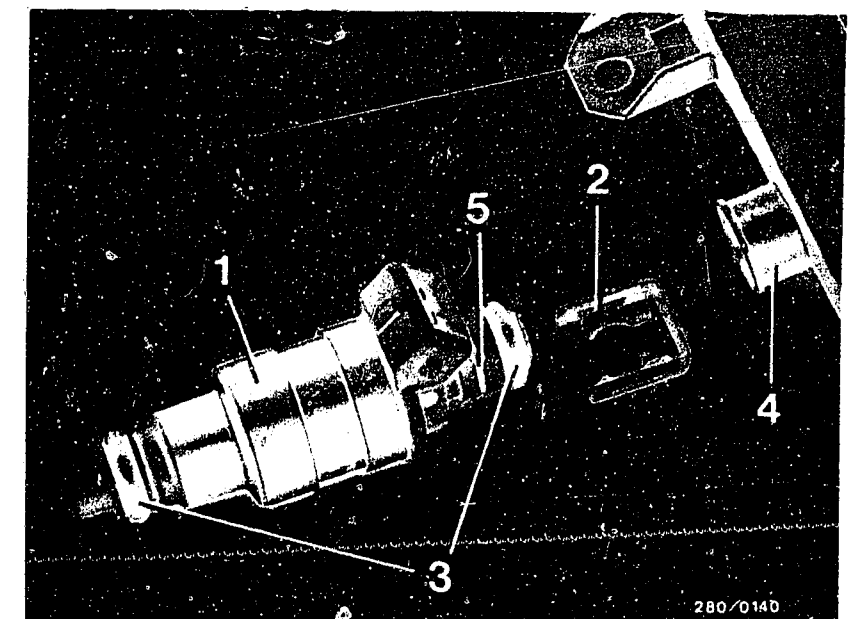
Yes

Continued on H15/H16



- 1 = Injection valve
- 2 = Fuel-distribution pipe
- 3 = Connection to start valve
- 4 = Mounting bracket
- 5 = Protection sleeve

- 1 = Injection valve
- 2 = Holding clamp
- 3 = Rubber seal
- 4 = Fuel-distribution pipe connection
- 5 = Groove



H13

Uneven engine idle
Volvo 760 Turbo



H14

Uneven engine idle
Volvo 760 Turbo



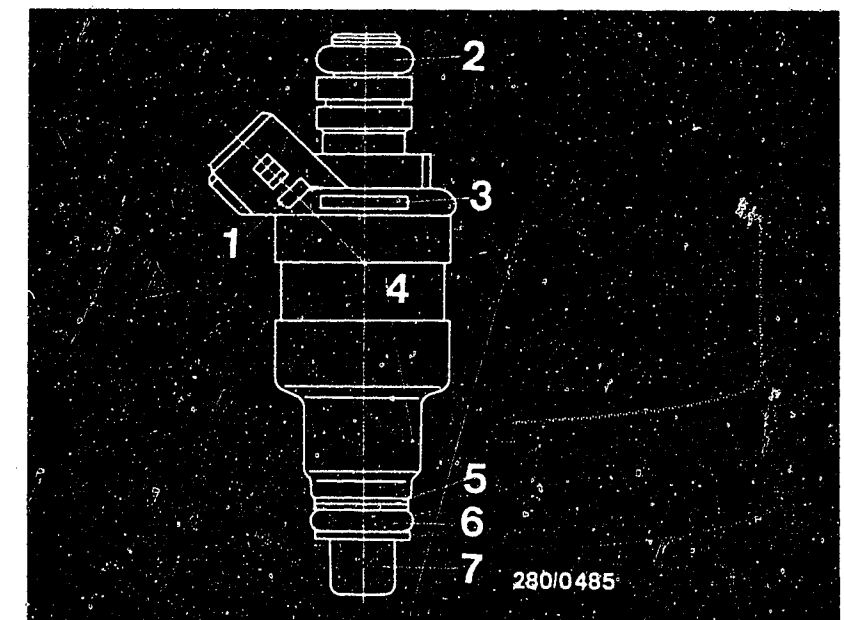
Uneven engine idle, speed adjustment (idle) and exhaust-gas adjustment
(continued)

When working on the injection valves, do not damage the nozzle needle.

Check both rubber seals for correct seating before installing. Press all 4 injection valves uniformly into their seats with the fuel-distribution pipe. Screw down fuel-distribution pipe. Check all air and fuel hoses for correct seating. Make electrical connections.

Start engine and check whether any unmetered air is being drawn in.

Yes



- 1 = FD mark
- 2 = Upper O-ring
- 3 = Part number
- 4 = Injection valve
- 5 = Supporting plate
- 6 = Lower O-ring
- 7 = Protection sleeve

Continued on H17/H18

H15

Uneven engine idle
Volvo 760 Turbo

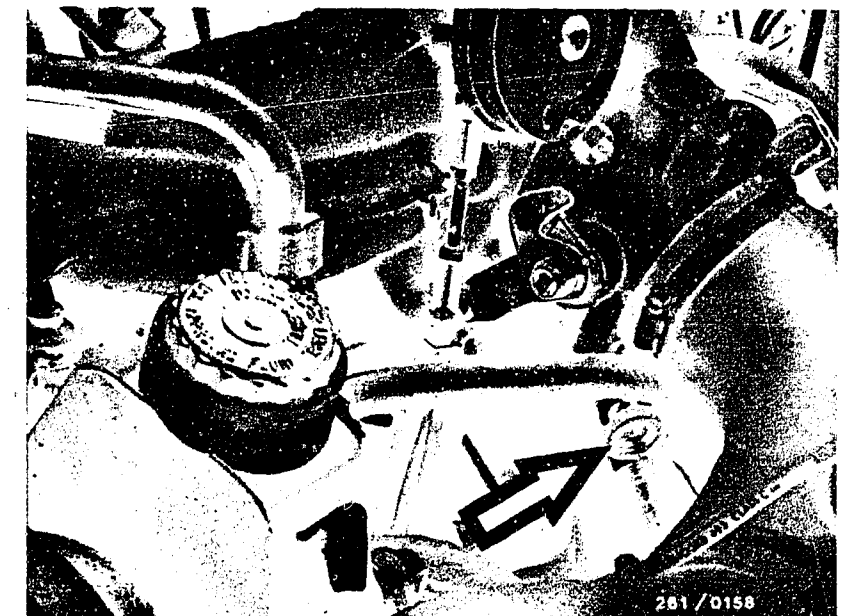
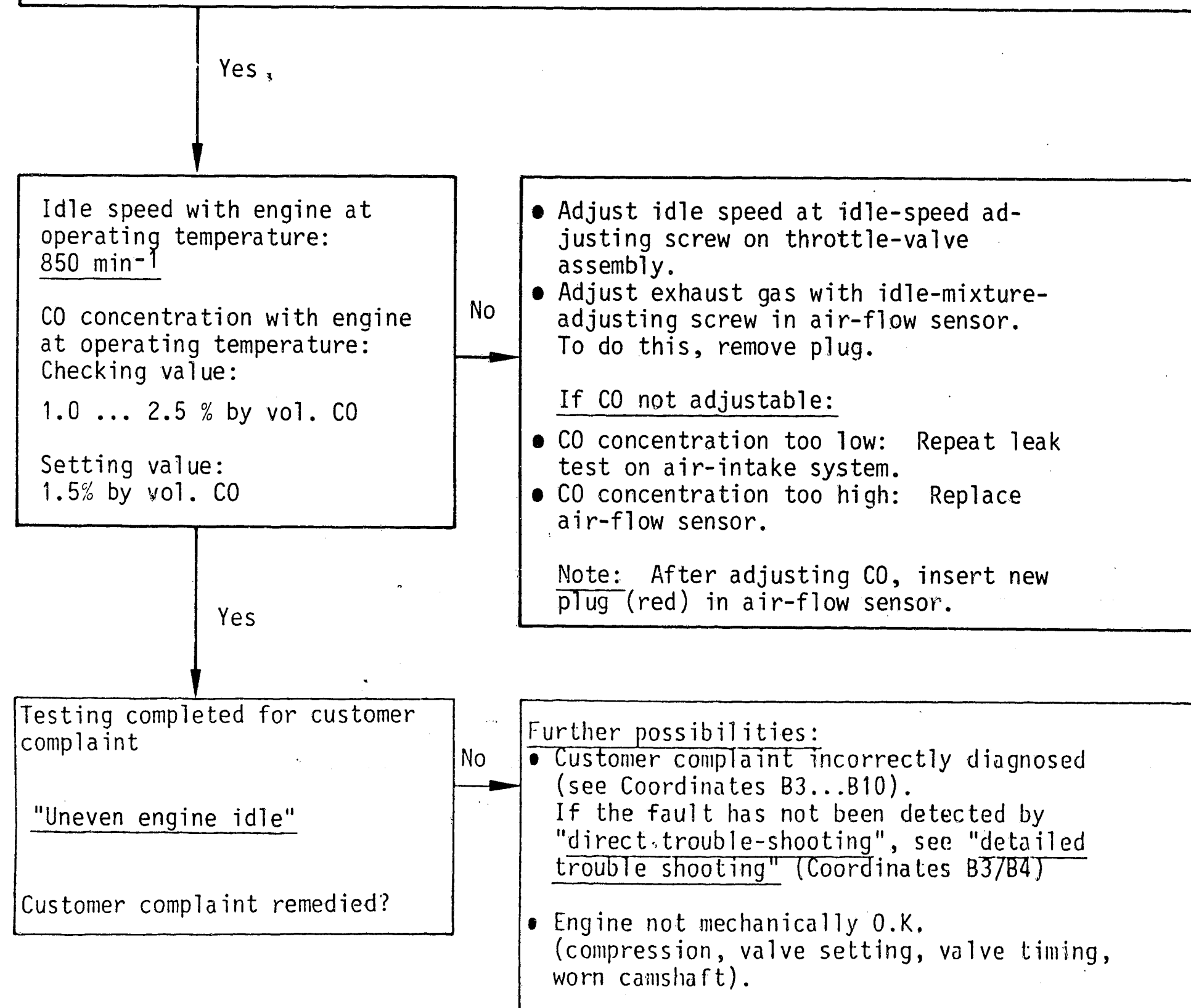


H16

Uneven engine idle
Volvo 760 Turbo

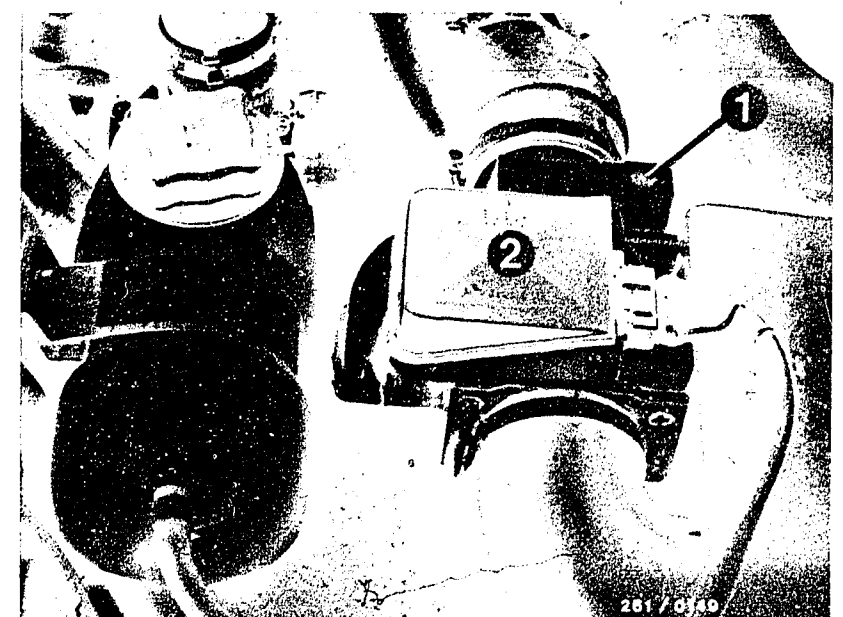


Uneven engine idle, speed adjustment (idle) and exhaust-gas test (continued)



Arrow = Idle-speed adjusting screw

1 = Idle-mixture-adjusting screw
2 = Air-flow sensor with NTC I



H17

Uneven engine idle
Volvo 760 Turbo



H18

Uneven engine idle
Volvo 760 Turbo



POOR THROTTLE TAKE-UP

Trouble-shooting program according to customer complaints

How to use the following trouble-shooting program

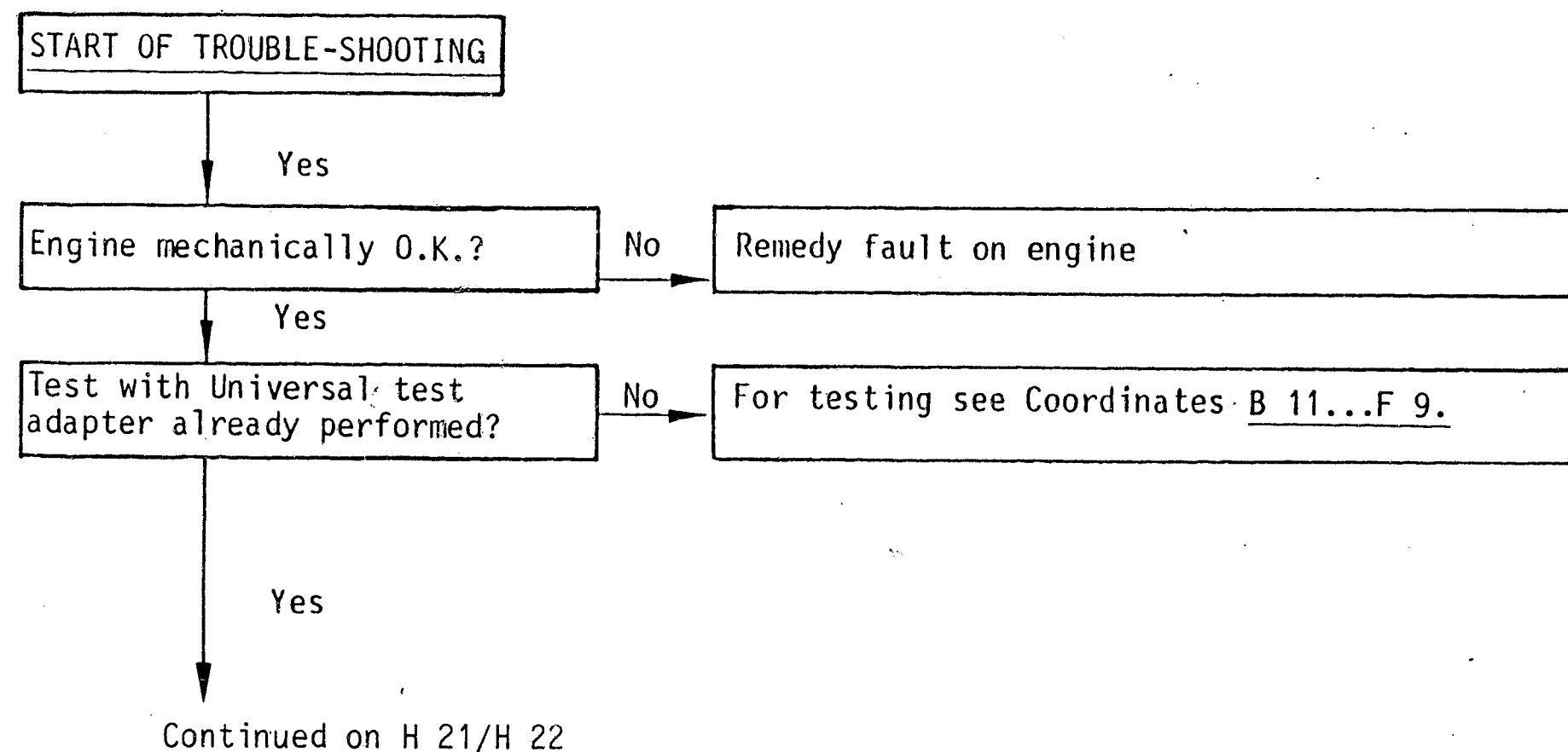
The program is divided into 3 rows of boxes:

1. The left-hand row contains the questions on the tests.
2. The middle row contains descriptions of the testing and adjustment operations on the components.
3. The right-hand row contains the illustrations belonging to the text and explains the illustrations.

If the questions can be answered conclusively with "yes" without testing, proceed to the next question below.

If, on the other hand, the answer to the question is "no", and you suspect a fault, branch to the middle row of boxes and carry out the tests given there.

When you have finished testing continue trouble-shooting at the point at which you branched off.



H 19

Poor throttle take-up
Volvo 760 Turbo



H 20

Poor throttle take-up
Volvo 760 Turbo



Poor throttle take-up (continued)

Yes

Check secondary pattern of all cylinders at cranking speed. Secondary pattern O.K.?

No

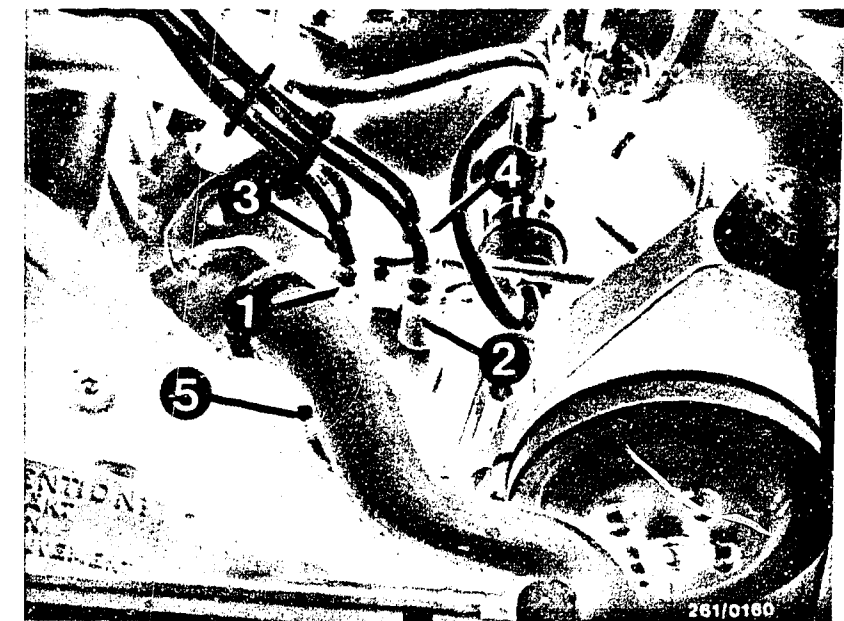
Check ignition coil and high-voltage distributor. Check distributor cap for dirt and arcing damage. Make sure that the plastic part is installed in the mounting slot of the high-voltage distributor. With this plastic part the high-voltage distributor is correctly adjusted. Note the cylinder numbers when connecting the H.T. cables. Do not forget screening cover. Check ignition coil primary for continuity (approx. $0\ \Omega$). Secondary resistance: 5 to 7.2 k Ω . Test interference-suppression resistors, H.T. ignition cables and spark plugs.

Interference-suppression resistor in

Distributor rotor:	1 k Ω
Distributor outer dome:	1 k Ω
Distributor center dome:	0 k Ω
Spark-plug connector:	5 k Ω
Ignition coil:	0 k Ω

Yes

Continued on H 23/H 24



1 to 4 = cylinder numbers
5 = fastening screw

H21

Poor throttle take-up
Volvo 760 Turbo



H22

Poor throttle take-up
Volvo 760 Turbo



Poor throttle take-up (continued)

Yes

Air-flow sensor mechanically
O.K.?

No

Testing: Open air-flow sensor flap by hand. It must be possible to open the air-flow sensor flap with uniform ease from its fully closed position to its fully open position. When released, the flap must close completely by itself. When the air-flow sensor flap is opened it must not catch at any point. Watch for any indications of abrasion or rubbing. Clean air-flow sensor if the inside is very dirty and rub out with a lint-free cloth. If there are any signs of abrasion or rubbing, replace the air-flow sensor.

Yes

Are all hose lines and electric
leads securely attached?
Visual examination.
Is the air-intake system leak-
tight?

No

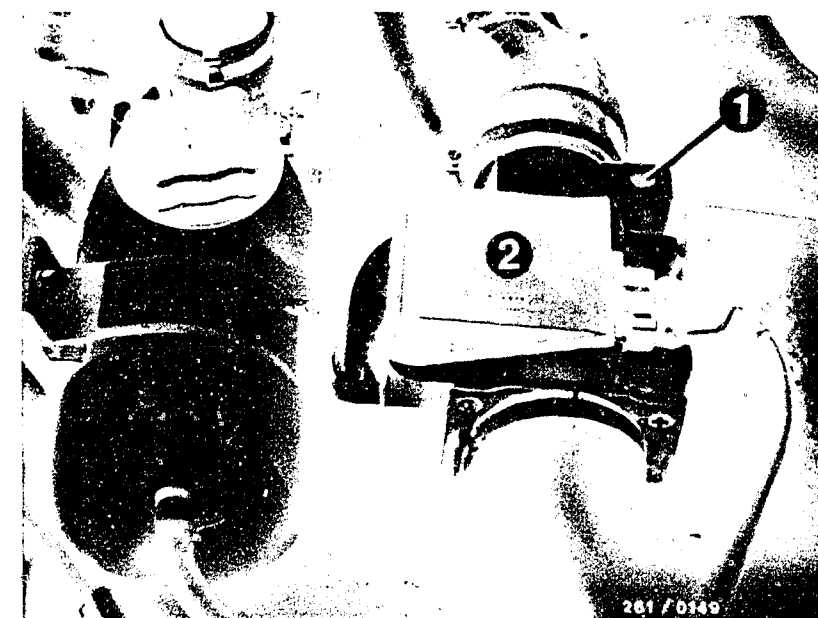
Check whether hoses of air-intake system and of fuel line system are securely attached, not kinked or damaged. If necessary, replace hoses. Eliminate leaks with new seals or by re-tightening the connecting screws.

Leak test:

Seal off exhaust tail pipe. Unscrew top part of air filter on air-flow sensor and seal off air-flow sensor duct. Remove hose after auxiliary-air device and using compressed-air gun blow air (0.3 bar gauge pressure) into intake manifold. Seal off connection port on auxiliary-air device. Open throttle valve fully while doing this. Brush or spray all joints with soapy water. Bubbling or foaming indicates a leak. Check electrical plug-in contacts for loose contact.

Yes

Continued on J 1/J 2



- 1 = Idle-mixture-adjusting screw
2 = Air-flow sensor with
NTC I

H23

Poor throttle take-up
Volvo 760 Turbo



H24

Poor throttle take-up
Volvo 760 Turbo



Poor throttle take-up (continued)

Yes

Auxiliary-air device tested?

No

Testing (mechanical):

1. Visual examination of auxiliary-air device:
Remove hoses and look down, using a small mirror. When cold, the device must be open when the engine is warm, it must be closed. If not, replace auxiliary-air device.

2. Functional test of auxiliary-air device:
With the engine cold, pinch off hose to auxiliary-air device. Engine speed must drop. With the engine warm, pinch off hose to auxiliary-air device. Engine speed must not drop. If incorrect, replace auxiliary-air device (pay attention to direction of flow).

3. Electrical test

Disconnect plug of auxiliary-air device. Connect ohmmeter to both terminals of the auxiliary-air device.

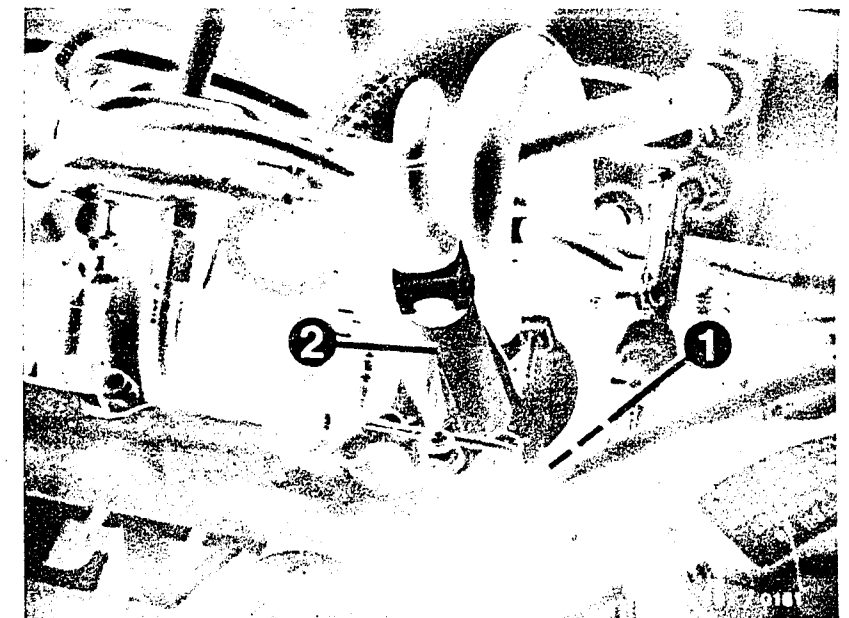
Test value

40...75 Ω

If a value outside the tolerance is shown, replace the auxiliary-air device.

Yes

Continued on J 3/J 4



1 = Start valve
2 = Auxiliary-air device

J1

Poor throttle take-up
Volvo 760 Turbo



J2

Poor throttle take-up
Volvo 760 Turbo



Poor throttle take-up (continued)

Yes

Testing completed for customer complaint

"Poor throttle take-up"

Customer complaint remedied?

No

Further possibilities:

- Customer complaint incorrectly diagnosed (See Coordinates B3...B10).
If the fault has not been detected by "direct trouble-shooting", see "detailed trouble-shooting" (Coordinates B3/B4).
- Engine not mechanically O.K. (Compression, valve setting, valve timing, worn camshaft).

J3

Poor throttle take-up
Volvo 760 Turbo



J4

Poor throttle take-up
Volvo 760 Turbo



ENGINE MISSING UNDER ALL OPERATING CONDITIONS

Trouble-shooting program according to customer complaints

How to use the following trouble-shooting program

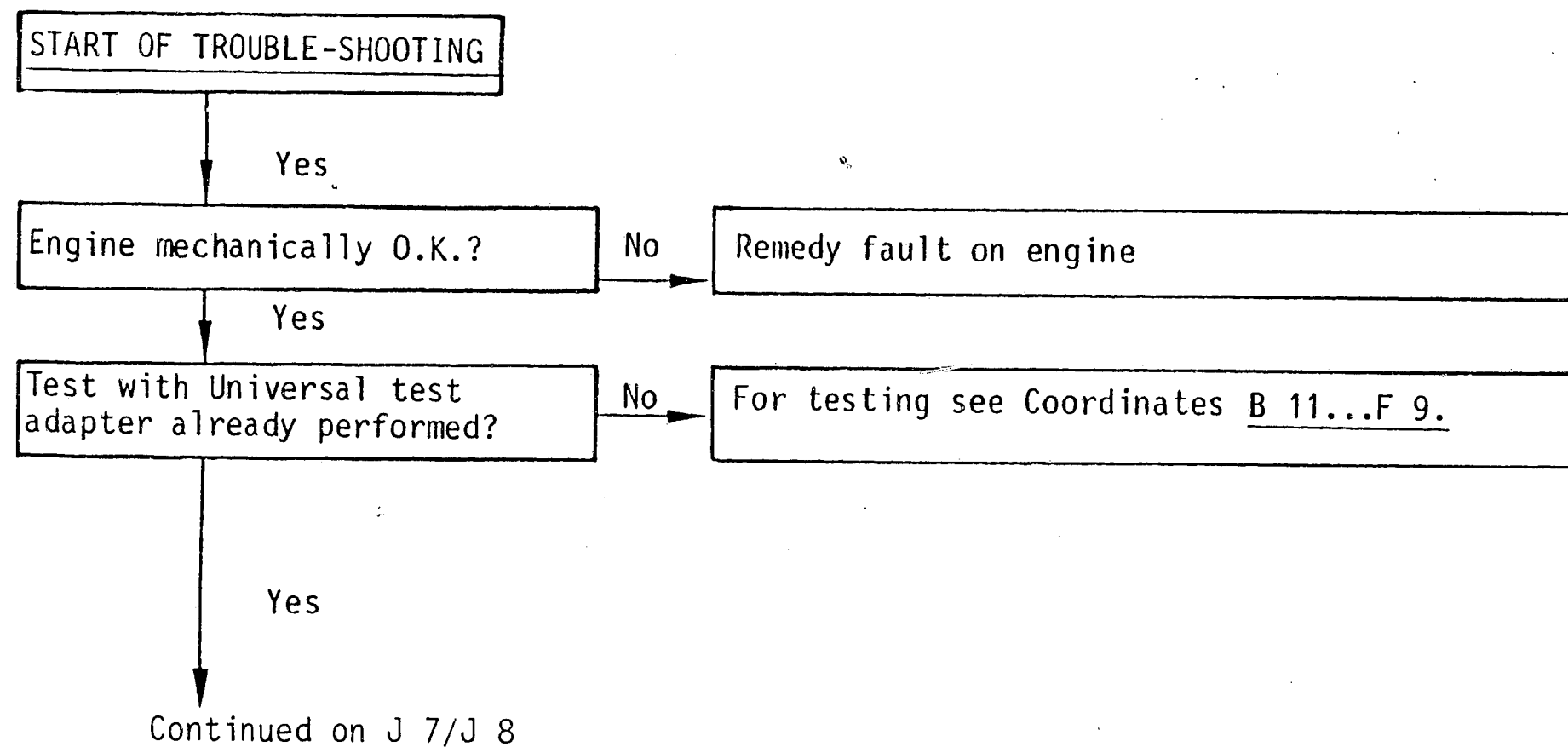
The program is divided into 3 rows of boxes:

1. The left-hand row contains the questions on the tests.
2. The middle row contains descriptions of the testing and adjustment operations on the components.
3. The right-hand row contains the illustrations belonging to the text and explains the illustrations.

If the questions can be answered conclusively with "yes" without testing, proceed to the next question below.

If, on the other hand, the answer to the question is "no", and you suspect a fault, branch to the middle row of boxes and carry out the tests given there.

When you have finished testing continue trouble-shooting at the point at which you branched off.



J5

Engine missing
Volvo 760 Turbo



J6

Engine missing
Volvo 760 Turbo



Engine missing under all operating conditions (continued)

Yes

Check secondary pattern of all cylinders at cranking speed. Secondary pattern O.K.?

No

Check ignition coil and high-voltage distributor. Check distributor cap for dirt and arcing damage. Make sure that the plastic part is installed in the mounting slot of the high-voltage distributor. With this plastic part the high-voltage distributor is correctly adjusted. Note the cylinder numbers when connecting the H.T. cables. Do not forget screening cover. Check ignition coil primary for continuity (approx. $0\ \Omega$). Secondary resistance: 5 to 7.2 k Ω . Test interference-suppression resistors, H.T. ignition cables and spark plugs.

Interference-suppression resistor in	
Distributor rotor:	1 k Ω
Distributor outer dome:	1 k Ω
Distributor center dome:	0 k Ω
Spark-plug connector:	5 k Ω
Ignition coil:	0 k Ω

Yes

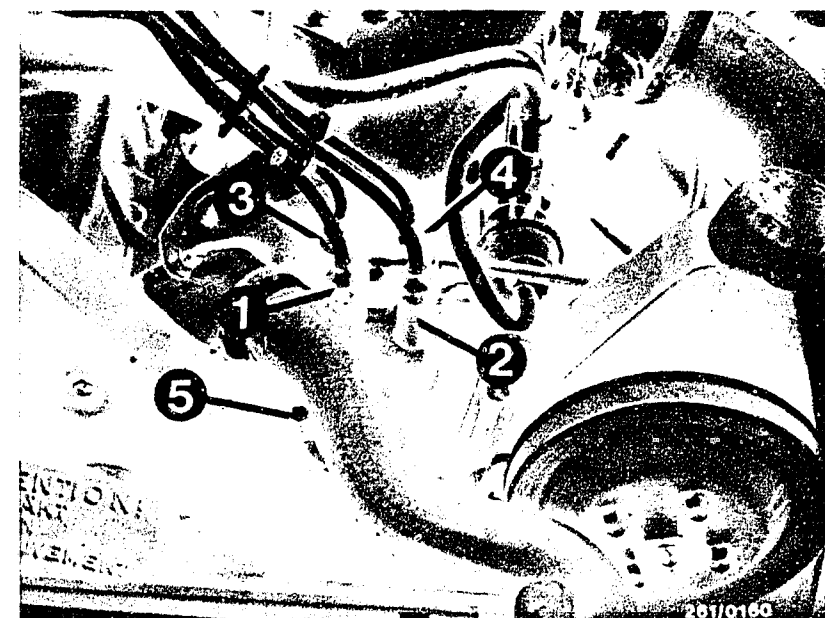
Plug-in connections of wiring harness and ground terminal O.K.?

No

Look for engine missing due to loose contacts as follows: Let the engine run, if possible on a chassis dynamometer. Keep the engine speed constant and watch for engine missing. Move the wiring harness and plug-in connections while doing this. Watch particularly for plug-in connections on engine-speed and reference-mark sensors. Ground terminal firmly secured? Check plug-in connections for security and corrosion. Spring contacts must be clipped in and must not move back. Check ground leads for continuity and loose contacts.

Yes

Continued on J 9/J 10



1 to 4 = Cylinder numbers
5 = Fastening screws

J7

Engine missing
Volvo 760 Turbo



J8

Engine missing
Volvo 760 Turbo



Engine missing under all operating conditions (continued)

Yes

Air-flow sensor O.K.?

No

Testing: Open air-flow sensor flap by hand. It must be possible to open the air-flow sensor flap with uniform ease from its fully closed position to its fully open position. When released, the flap must close completely by itself. When the air-flow sensor flap is opened it must not catch at any point. Watch for any indications of abrasion or rubbing. Clean air-flow sensor if the inside is very dirty and rub out with a lint-free cloth. If there are any signs of abrasion or rubbing, replace the air-flow sensor.

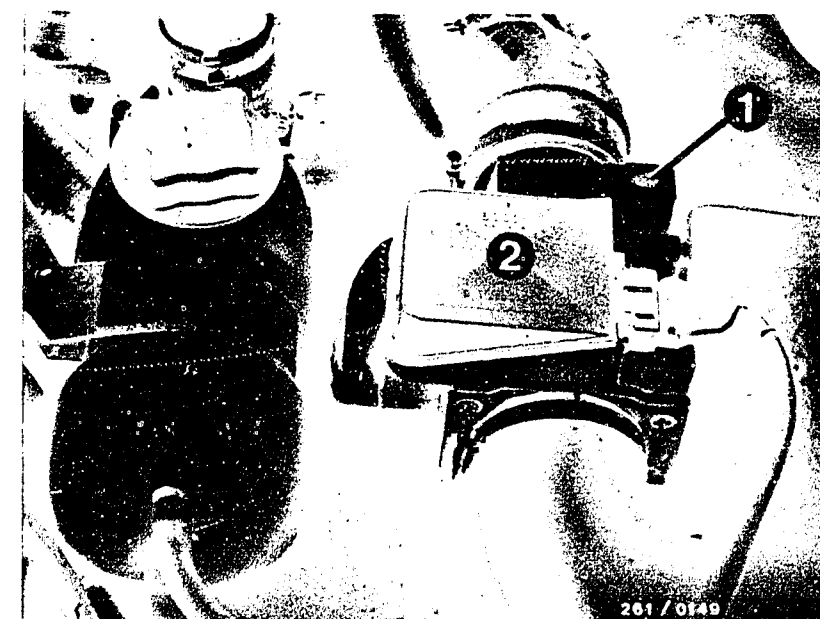
Potentiometer test (noise test)

Remove air-flow sensor. Leave plug on. Set motortester to special input and connect using special cable to air-flow sensor term. 7 (red clip) and term. 6 (black clip). Set control stick for image adjustment on motortester as far as it will go to the left (calibrated setting). Deflect air-flow sensor flap suddenly (several times).

If air-flow sensor O.K., a continuous stroke signal must be visible on the oscilloscope. If air-flow sensor is defective, there is a noise signal similar to that in the diagram opposite. Replace air-flow sensor.

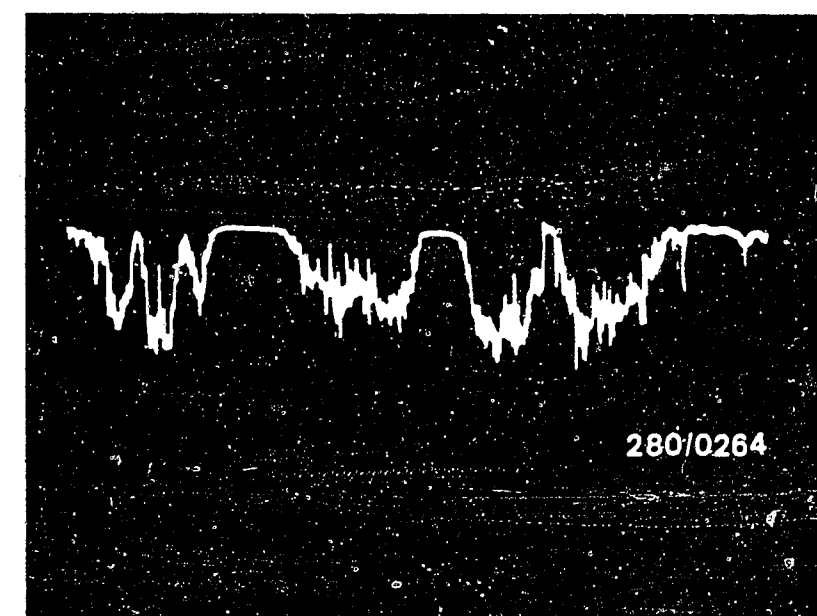
Yes

Continued on J 11/J 12



1 = Idle-mixture-adjusting screw
2 = Air-flow sensor with NTC I

Noise signal if air-flow sensor defective



J9

Engine missing
Volvo 760 Turbo



J10

Engine missing
Volvo 760 Turbo



Engine missing under all operating conditions (continued)

Yes

Fuel delivery O.K.?
Test specification:
min. 850 cm³/30 s

No

Measuring the fuel delivery:
For testing, loosen fuel return hose from pressure regulator. If necessary, extend hose and lead into a 5 l vessel with graduated scale. Switch on fuel pump with test adapter (program switch "V" at position 17, press button T3).
Test specification: min. 850 cm³/30 s

Remedy if test specification not reached:

- Fuel filter clogged → replace.
- Voltage across fuel pump plugs with engine running min. 12 V → clean contacts, possibly eliminate poor ground connection, replace leads.
- Fuel pressure regulator defective → replace.
- Fuel pump delivery too low → replace fuel pump.

Yes

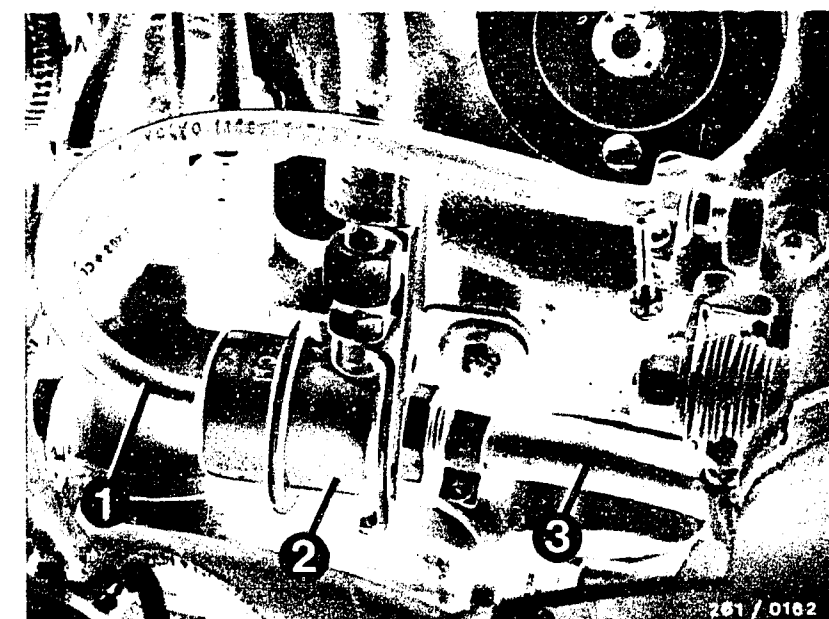
Control unit O.K.?

No

Let engine run. Shake control unit lightly and move multiple plug. Watch for engine missing. Repair plug-in connection on multiple plug or replace defective control unit.

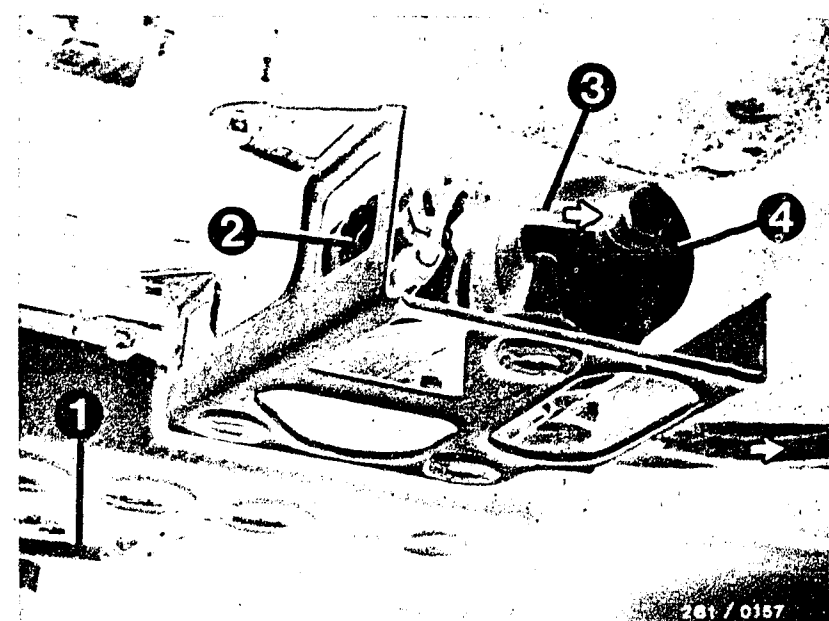
Yes

Continued on J13/J14



1 = Vacuum hose
2 = Pressure regulator
3 = Fuel return line

1 = Fuel intake line
2 = Electric fuel pump
3 = Fuel delivery line
4 = Fuel filter
Arrows = Direction of flow



J11

Engine missing
Volvo 760 Turbo

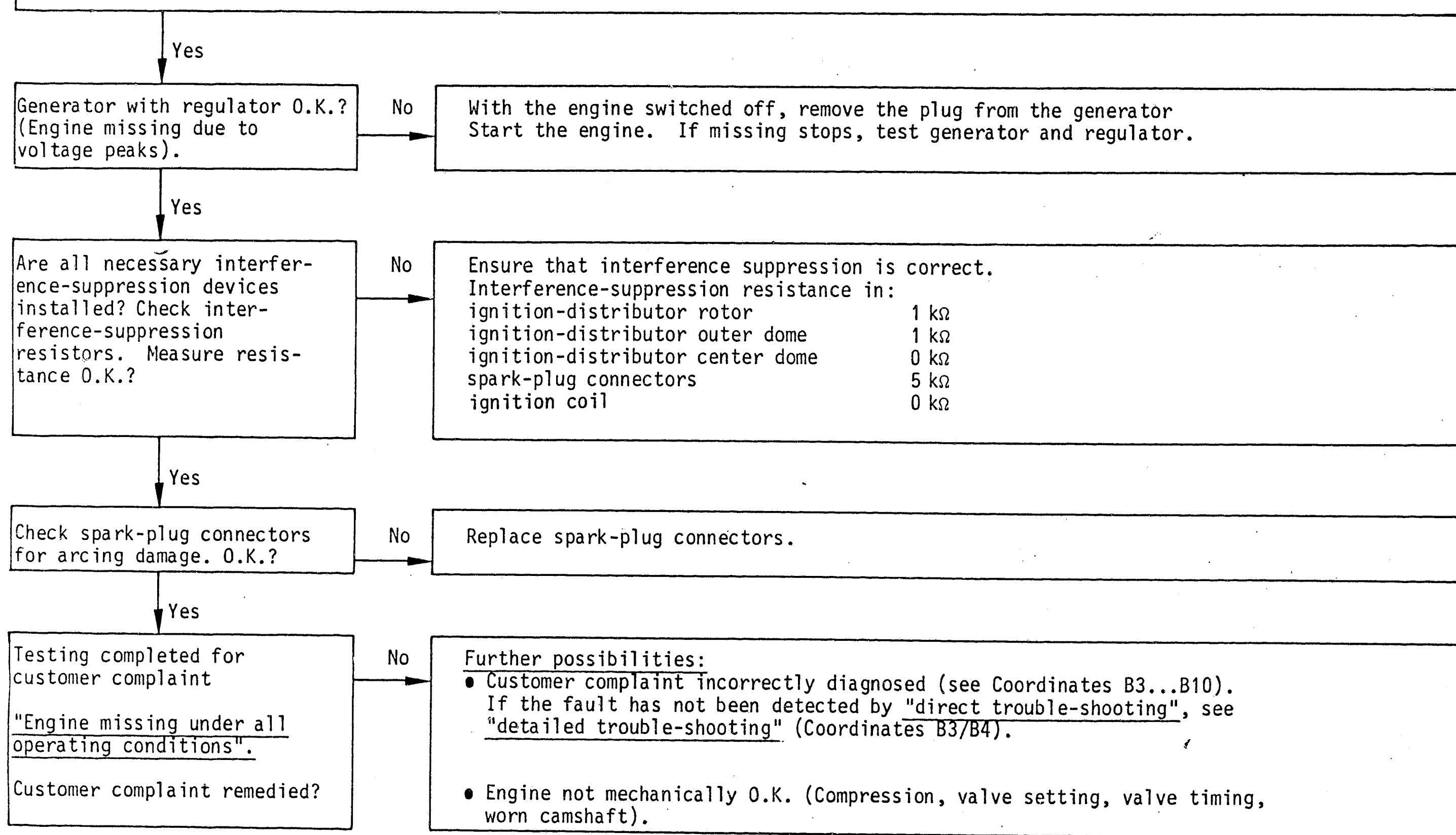


J12

Engine missing
Volvo 760 Turbo



Engine missing under all operating conditions (continued)



J15

Engine missing
Volvo 760 Turbo



J16

Engine missing
Volvo 760 Turbo



Engine missing under all operating conditions (continued)

Yes

Vehicle bucking when shifting into overdrive:
Time-delay relay and its energization O.K.?

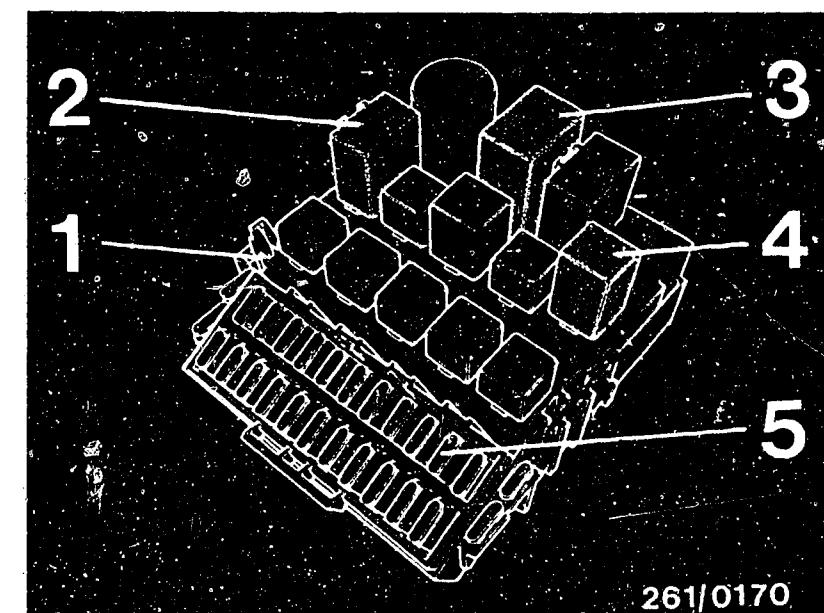
No

Operation of time delay relay:

If overdrive is selected in 4th gear under load, then the time-delay relay switches off the injection valve of cylinder 2 for 0.3 seconds to reduce the torque and enable smooth, gentle shifting into overdrive.
Replace time-delay relay and test the associated components as well as leads according to circuit diagram.

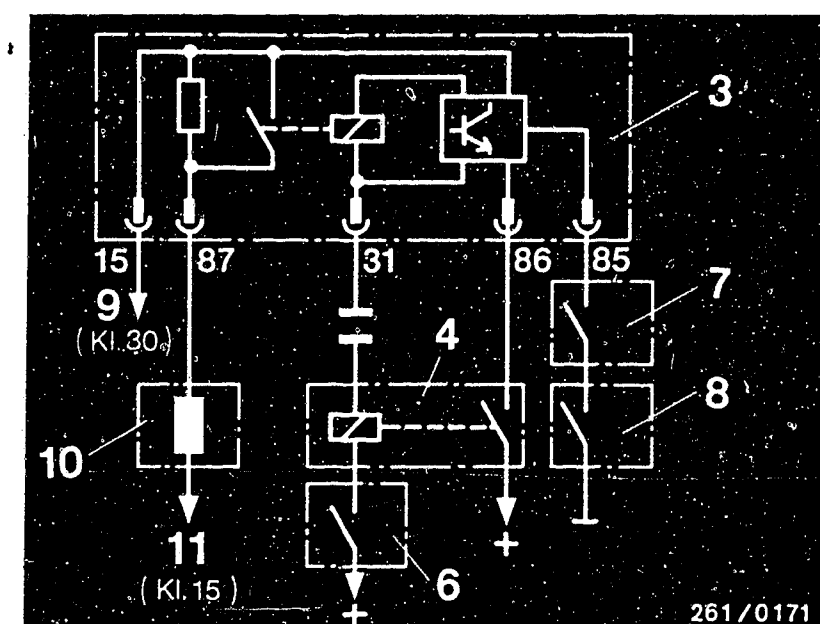
Yes

Continued on J15/J16



261/0170

- 1 = Central-electrics console
- 2 = Relay set
- 3 = Time-delay relay
- 4 = Relay for overdrive
- 5 = Fuses
- 6 = Switch for overdrive
- 7 = Hydraulic pressure switch on transmission
- 8 = Charge-air pressure switch
- 9 = To relay set
- 10 = Injection valve
- 11 = To control unit



261/0171

J13

Engine missing
Volvo 760 Turbo



J14

Engine missing
Volvo 760 Turbo



FUEL CONSUMPTION TOO HIGH

Trouble-shooting program according to customer complaints

How to use the following trouble-shooting program

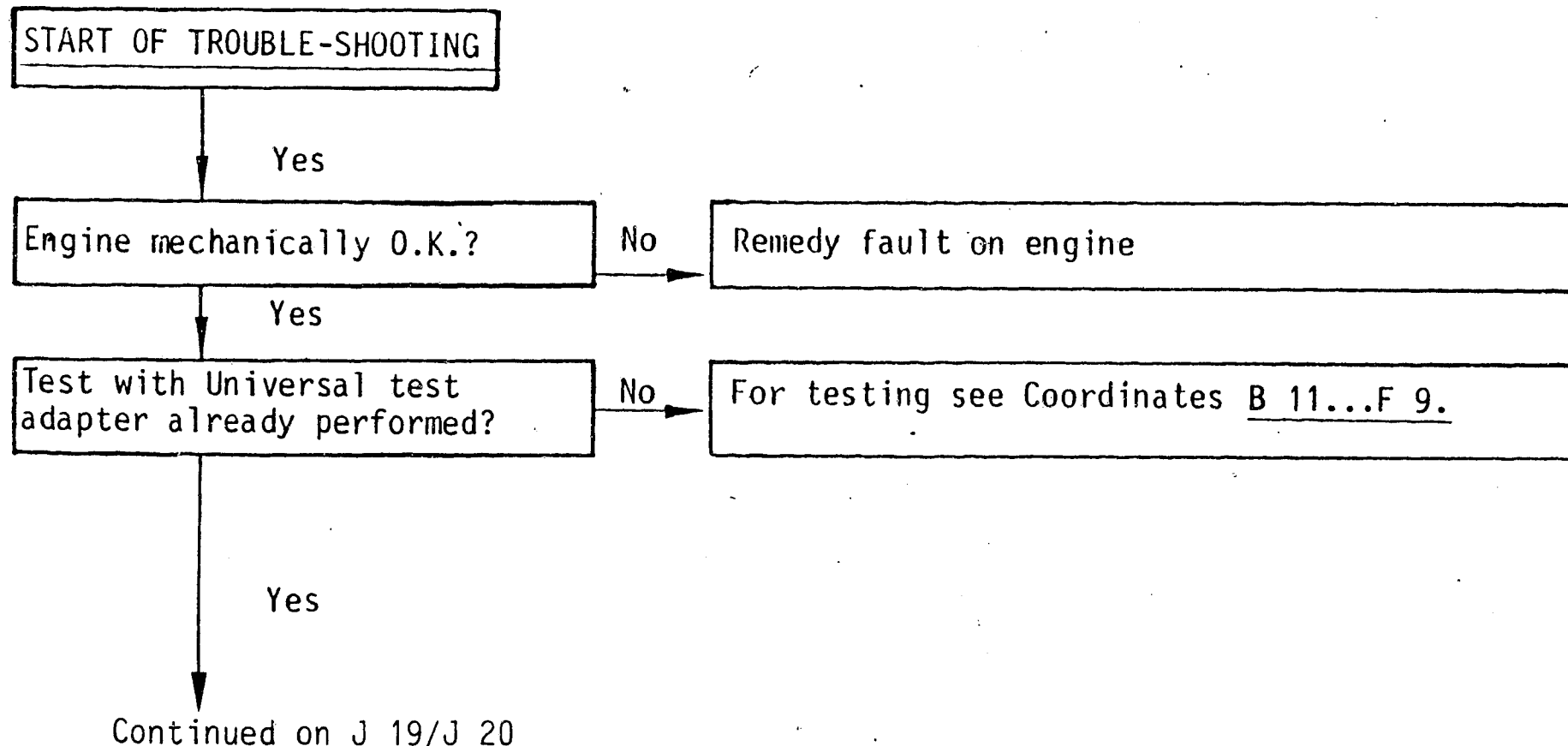
The program is divided into 3 rows of boxes:

1. The left-hand row contains the questions on the tests.
2. The middle row contains descriptions of the testing and adjustment operations on the components.
3. The right-hand row contains the illustrations belonging to the text and explains the illustrations.

If the questions can be answered conclusively with "yes" without testing, proceed to the next question below.

If, on the other hand, the answer to the question is "no", and you suspect a fault, branch to the middle row of boxes and carry out the tests given there.

When you have finished testing continue trouble-shooting at the point at which you branched off.



J17

Fuel consumption too high
Volvo 760 Turbo



J18

Fuel consumption too high
Volvo 760 Turbo



Fuel consumption too high (continued)

Yes

Check secondary pattern of all cylinders at cranking speed. Secondary pattern O.K.?

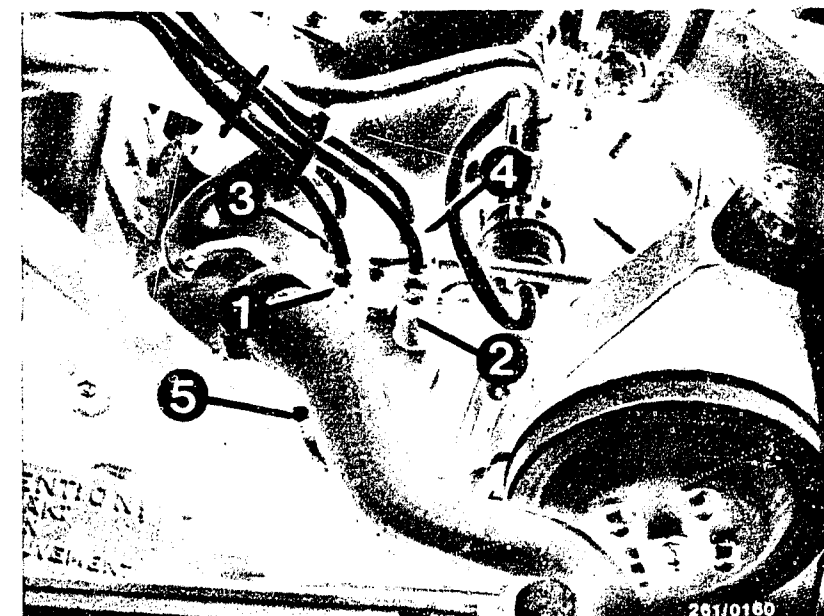
No

Check ignition coil and high-voltage distributor. Check distributor cap for dirt and arcing damage. Make sure that the plastic part is installed in the mounting slot of the high-voltage distributor. With this plastic part the high-voltage distributor is correctly adjusted. Note the cylinder numbers when connecting the H.T. cables. Do not forget screening cover. Check ignition coil primary for continuity (approx. 0 Ω). Secondary resistance: 5 to 7.2 k Ω . Test interference-suppression resistors, H.T. ignition cables and spark plugs.

Interference-suppression resistor in	
Distributor rotor:	1 k Ω
Distributor outer dome:	1 k Ω
Distributor center dome:	0 k Ω
Spark-plug connector:	5 k Ω
Ignition coil:	0 k Ω

Yes

Continued on J 21/J 22



1 to 4 = Cylinder numbers
5 = Fastening screws

J19

Fuel consumption too high
Volvo 760 Turbo



J20

Fuel consumption too high
Volvo 760 Turbo



Fuel consumption too high (continued)

Yes

Have all brakes released fully?

Yes

Start valve O.K.?

no

Testing the start valve for leaks:

1. When installed

Switch over directional-control valve of pressure gauge so that start valve is disconnected from fuel-distribution pipe. If engine now runs, replace start valve.

2. When removed

Remove start valve (Caution! Fire hazard!)

Fuel line and electric lead remain connected (place collector vessel under the start valve).

Build up fuel pressure:

On the universal test adapter set the program switch "V" to position 17. Switch on the ignition and press button T 3.

Test specification: Within one minute max. 1 drop may form at the mouth of the valve.

1 = Start valve
2 = Auxiliary-air device

Yes

Continued on J 23/J 24

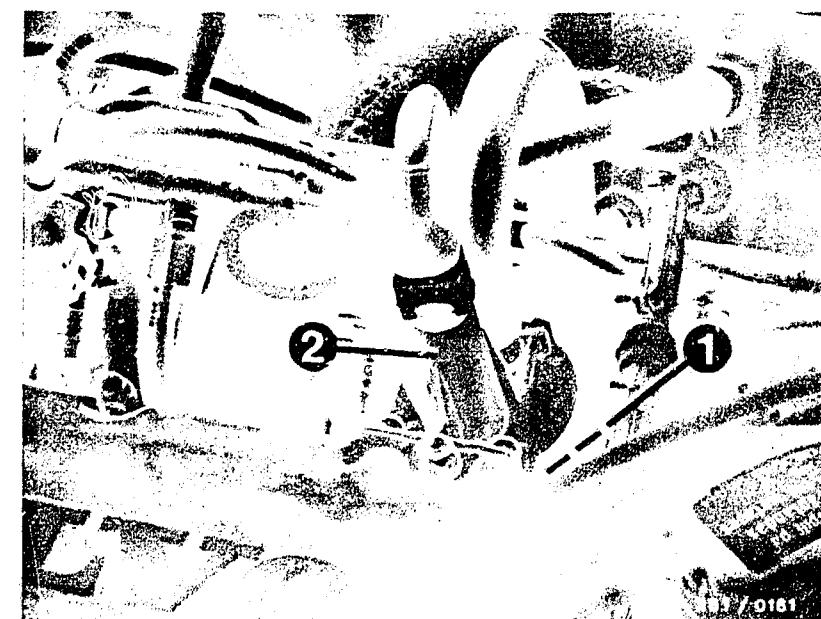
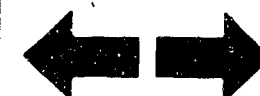
J21

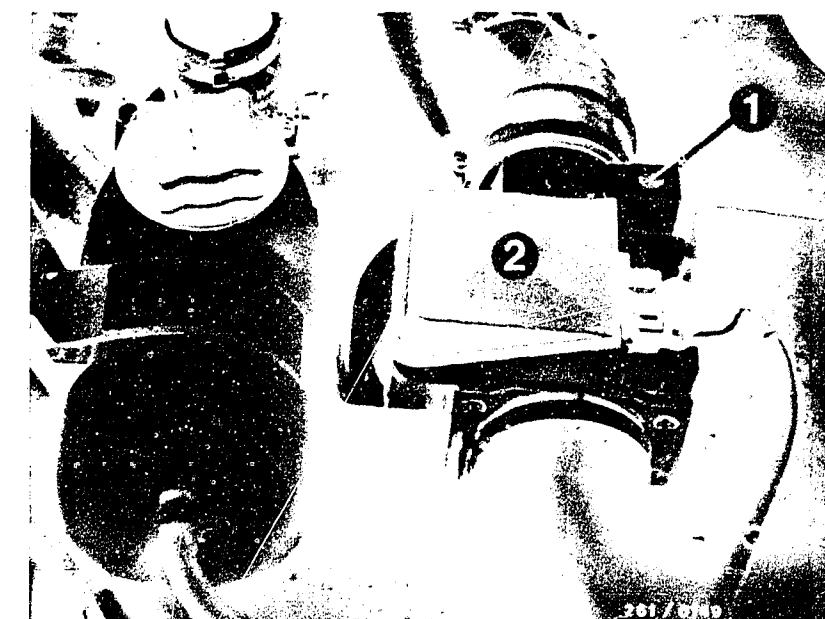
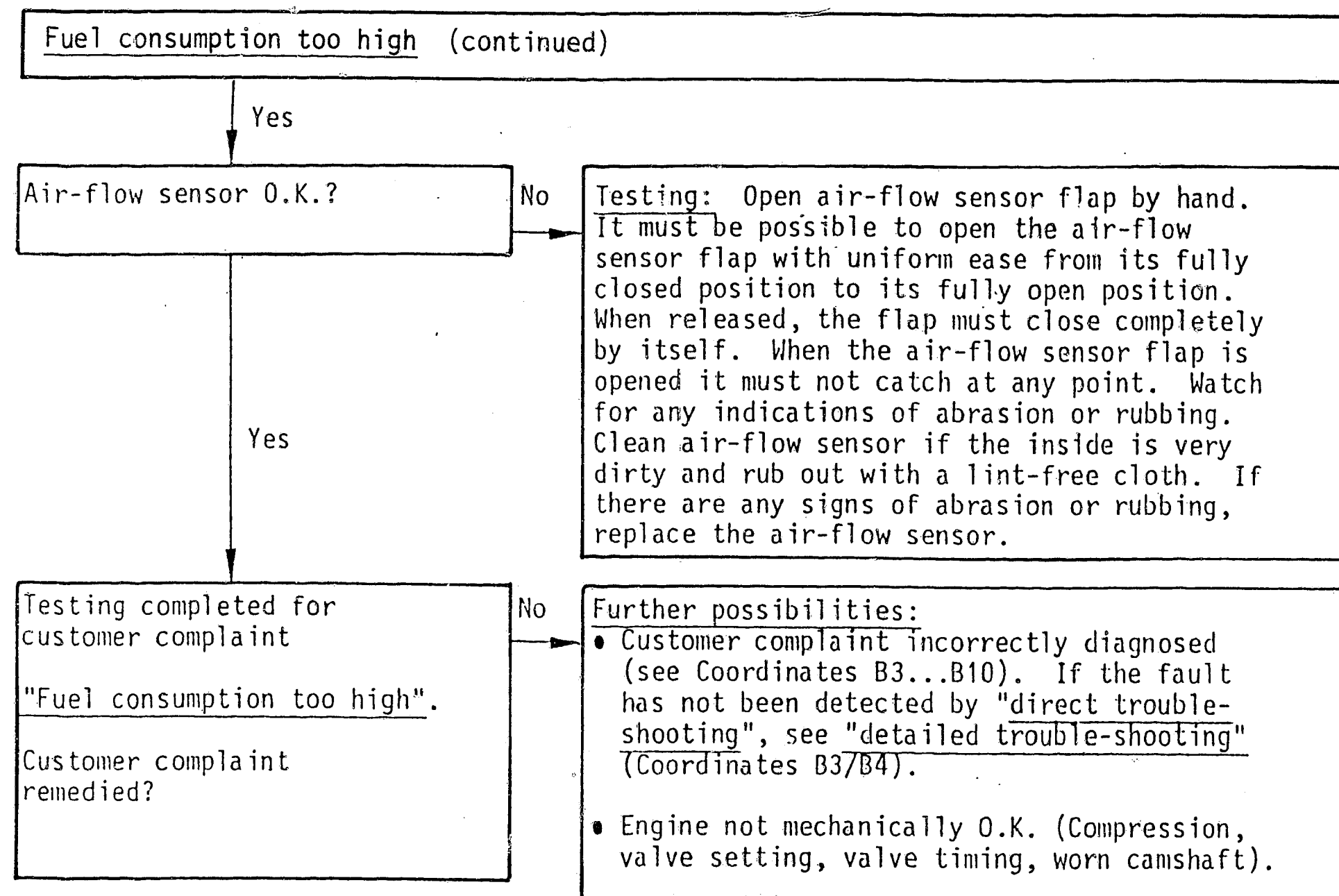
Fuel consumption too high
Volvo 760 Turbo



J22

Fuel consumption too high
Volvo 760 Turbo





1 = Idle-mixture-adjusting screw
2 = Air-flow sensor with NTC I



NO MAXIMUM ENGINE POWER / TOP SPEED NOT REACHED

Trouble-shooting program according to customer complaints

How to use the following trouble-shooting program

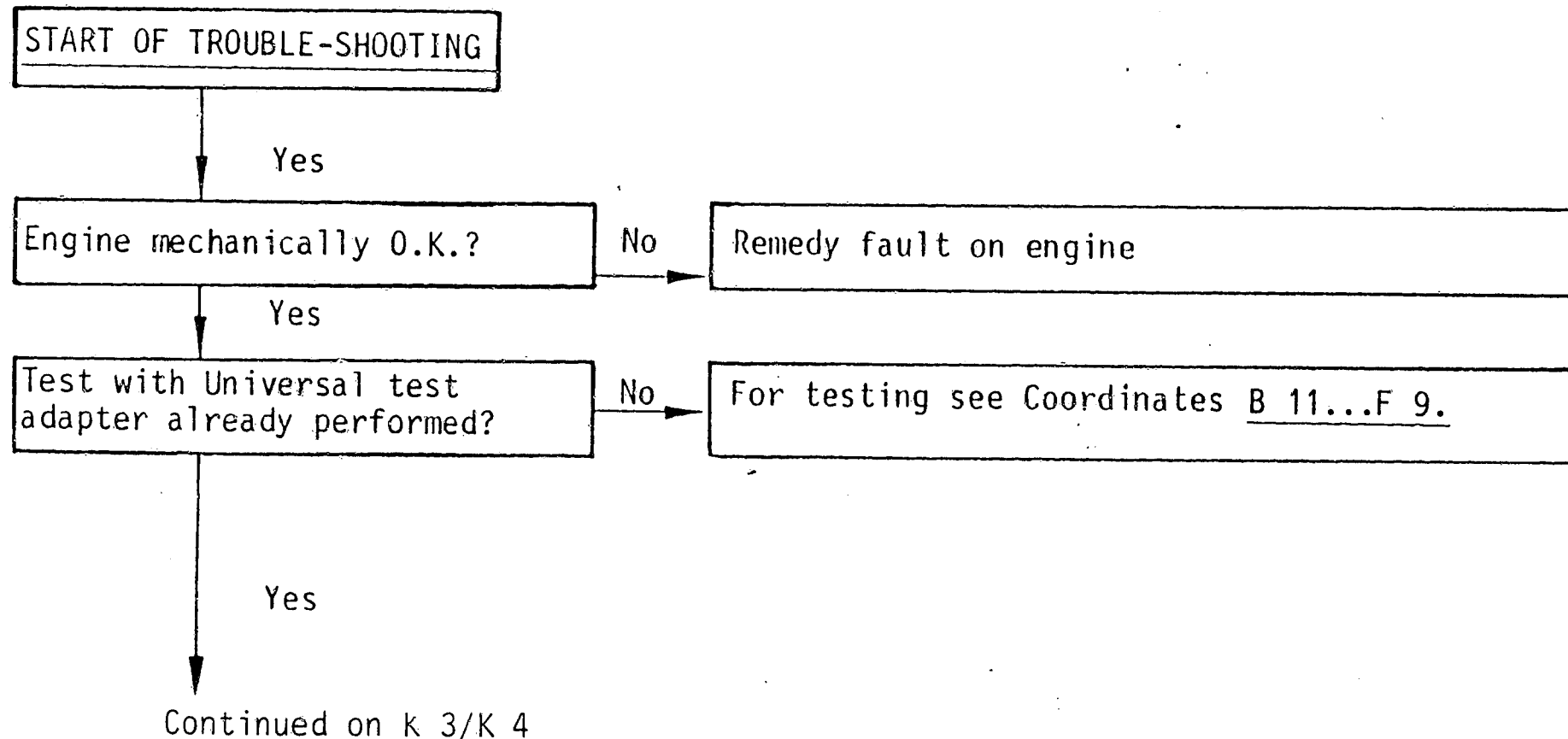
The program is divided into 3 rows of boxes:

1. The left-hand row contains the questions on the tests.
2. The middle row contains descriptions of the testing and adjustment operations on the components.
3. The right-hand row contains the illustrations belonging to the text and explains the illustrations.

If the questions can be answered conclusively with "yes" without testing, proceed to the next question below.

If, on the other hand, the answer to the question is "no", and you suspect a fault, branch to the middle row of boxes and carry out the tests given there.

When you have finished testing continue trouble-shooting at the point at which you branched off.



K1

No maximum engine power
Volvo 760 Turbo



K2

No maximum engine power
Volvo 760 Turbo



No maximum engine power / top speed not reached (continued)

Yes

Check secondary pattern of all cylinders at cranking speed. Secondary pattern O.K.?

no

Check ignition coil and high-voltage distributor. Check distributor cap for dirt and arcing damage. Make sure that the plastic part is installed in the mounting slot of the high-voltage distributor. With this plastic part the high-voltage distributor is correctly adjusted. Note the cylinder numbers when connecting the H.T. cables. Do not forget screening cover. Check ignition coil primary for continuity (approx. 0 Ω). Secondary resistance: 5 to 7.2 k Ω . Test interference-suppression resistors, H.T. ignition cables and spark plugs.

Distributor rotor:	1 k Ω
Distributor outer dome:	1 k Ω
Distributor center dome:	0 k Ω
Spark-plug connector:	5 k Ω
Ignition coil:	0 k Ω

Yes

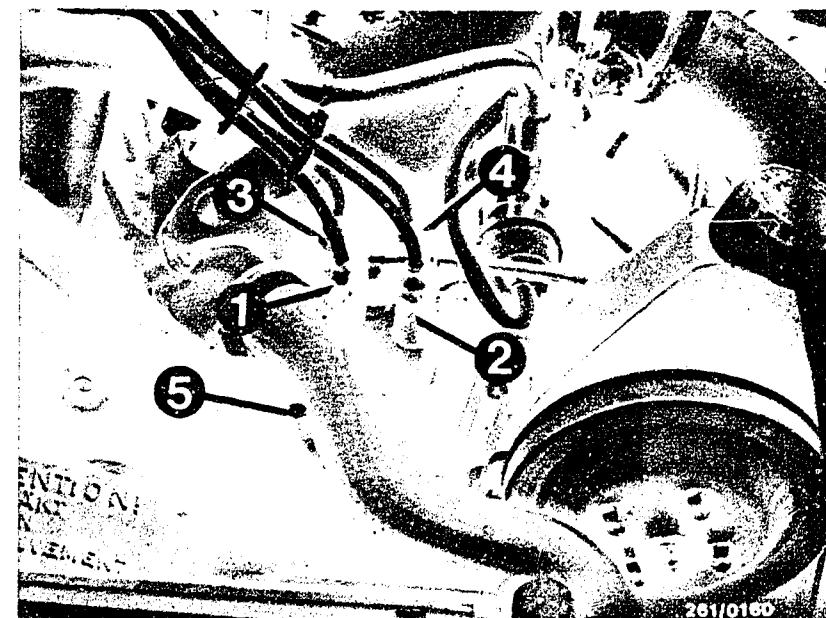
Does throttle valve open fully?

no

Throttle cable, throttle linkage and accelerator O.K.? If necessary, adjust throttle cable and throttle linkage. Accelerator may stick due to floor mat etc.

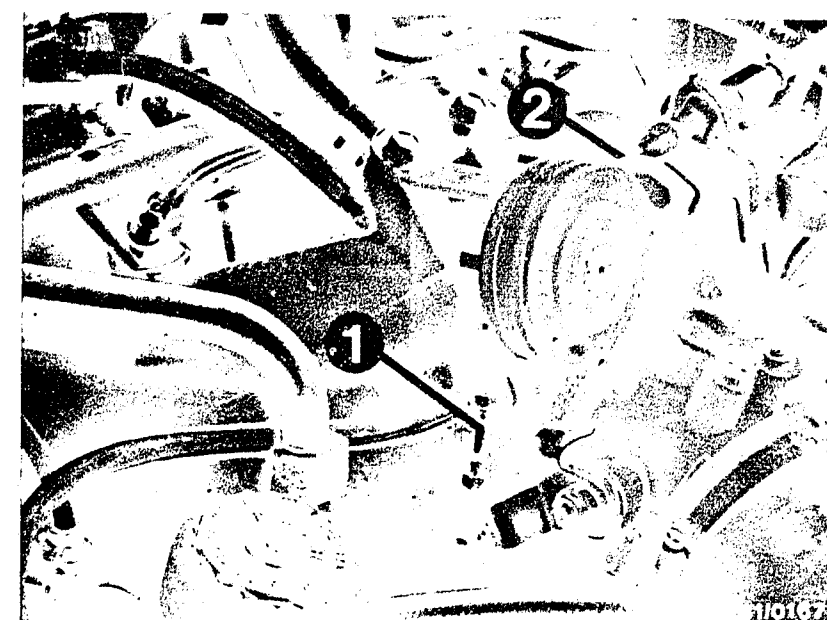
Yes

Continued on K 5/K 6



1 to 4 = Cylinder numbers
5 = Fastening screw

1 = Throttle linkage
2 = Throttle cable



K3

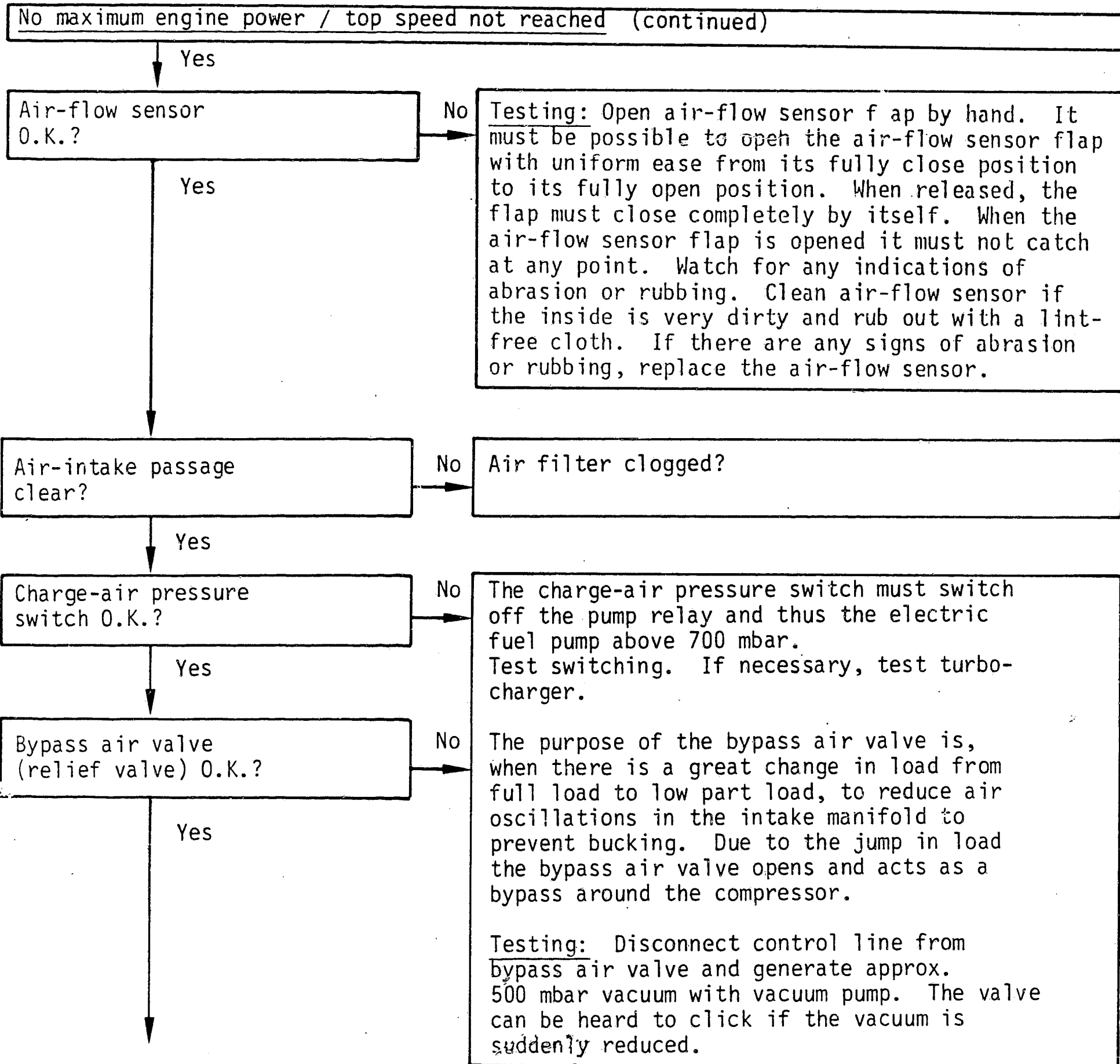
No maximum engine power
Volvo 760 Turbo



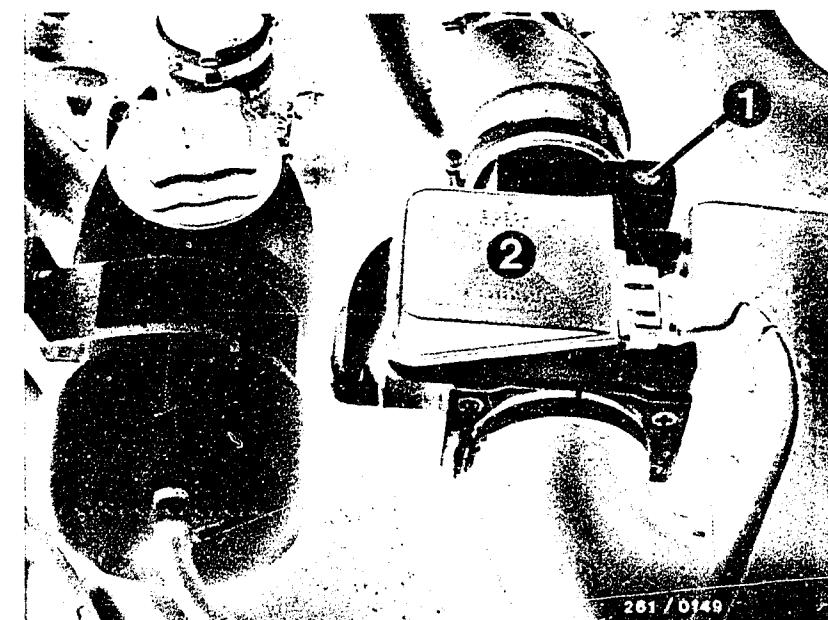
K4

No maximum engine power
Volvo 760 Turbo

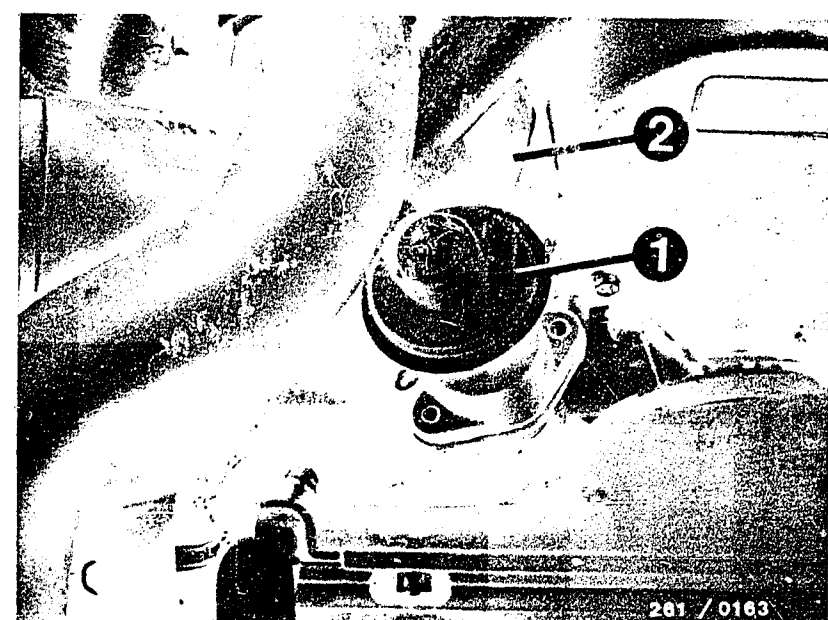




Continued on K 7/K 8



1 = Idle-mixture-adjusting screw
2 = Air-flow sensor with NTC I



1 = Bypass air valve
2 = Control line

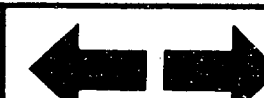
K5

No maximum engine power
Volvo 760 Turbo



K6

No maximum engine power
Volvo 760 Turbo



No maximum engine power/top speed cannot be reached (continued)

Yes

Fuel delivery O.K.?
Test specification:
min. 850 cm³/30 s

No

Yes

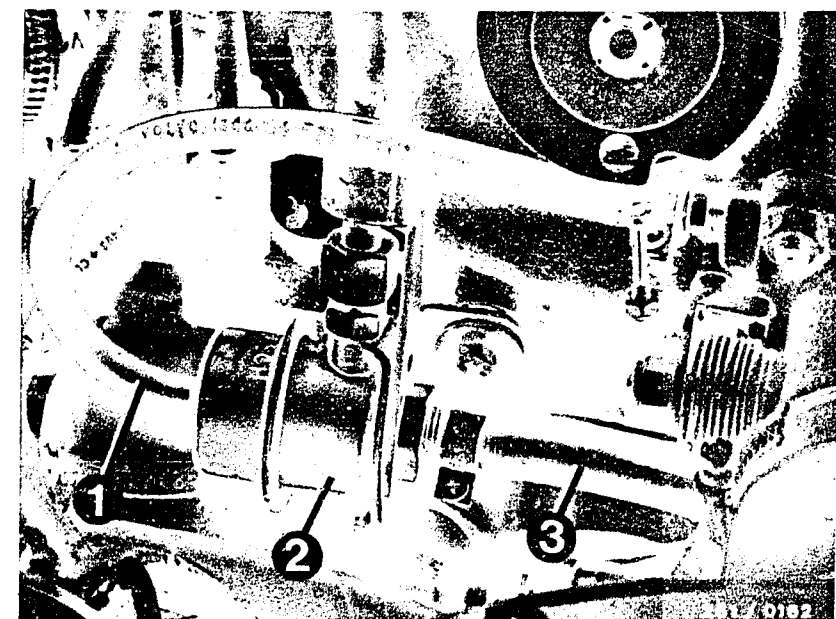
Measuring the fuel delivery:

For testing, loosen fuel return hose from pressure regulator. If necessary, extend hose and lead into a 5 l vessel with graduated scale. Switch on fuel pump with test adapter (program switch "V" at position 17, press button T3).

Test specification: min. 850 cm³/30 s

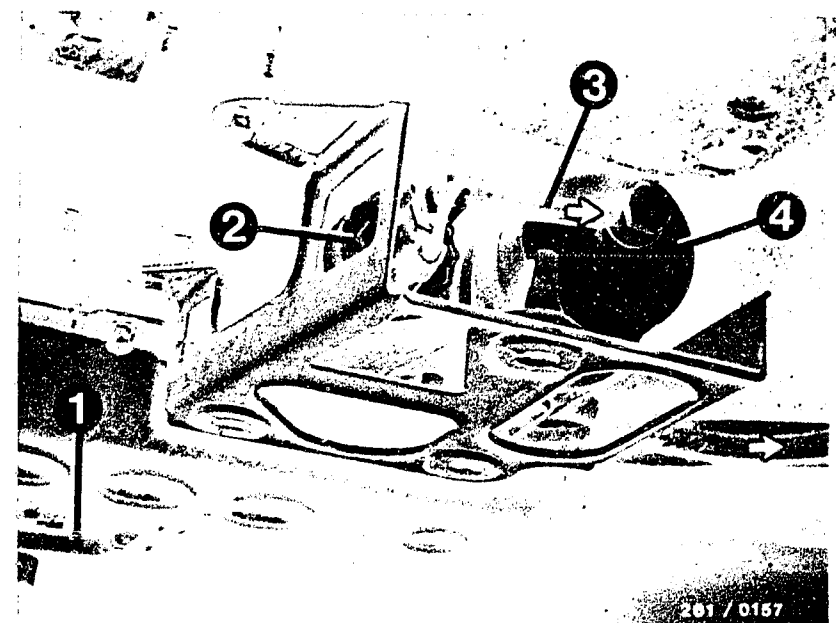
Remedy if test specification not reached:

- Fuel filter clogged → replace.
- Voltage across fuel pump plugs with engine running min. 12 V → clean contacts, possibly eliminate poor ground connection, replace leads.
- Check pre-supply pump.
Listen: Remove connector from electric fuel pump. Build up fuel pressure: on universal test adapter, set program switch "V" to position 17. Switch on ignition and press button T 3. Pre-supply pump must operate. If not, check connecting leads and, if necessary, replace pre-supply pump.
- Fuel-pressure regulator defective → replace.
- Fuel pump delivery too low → replace fuel pump.
- Strainer in tank clogged? Corrosion in tank?



1 = Vacuum hose
2 = Pressure regulator
3 = Fuel return line

1 = Fuel intake line
2 = Electric fuel pump
3 = Fuel delivery line
4 = Fuel filter
Arrows = Direction of flow



Continued on K 9/K 10

K7

No maximum engine power
Volvo 760 Turbo



K8

No maximum engine power
Volvo 760 Turbo



No maximum engine power/top speed cannot be reached (continued)

Yes

Fuel pressure at full load O.K.?

No

Install pressure gauge on start valve.

Caution:

Catch any escaping fuel.

Danger of fire with hot engine and electric sparks

Let engine idle:

Fuel pump pressure approx. 2,5 bar.

Remove air hose to intake manifold on pressure regulator:

Fuel pump pressure: 2,8...3,2 bar (reading may fluctuate slightly). Reconnect air hose.

Test fuel pressure on chassis dynamometer under load (3rd gear, full load braked, approx. 3000 min⁻¹):

Fuel pressure rises to approx. 3.5 bar.

Max. charge-air pressure between 0.45 and 0.53 bar.

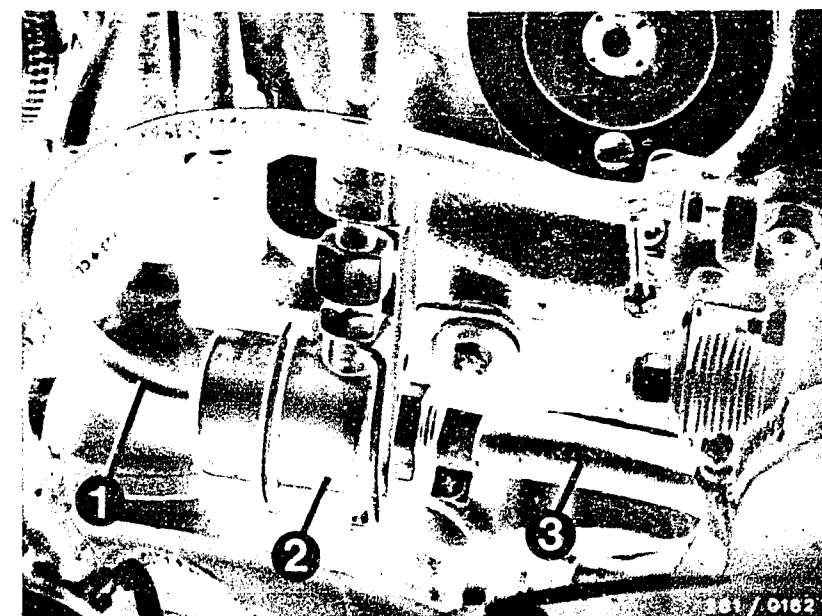
Trouble-shooting:

- Fuel filter clogged → replace.
- Voltage at fuel pump plugs, with engine running, min. 12 V. If not, clean contacts; possibly eliminate poor ground connection, replace leads.

Yes

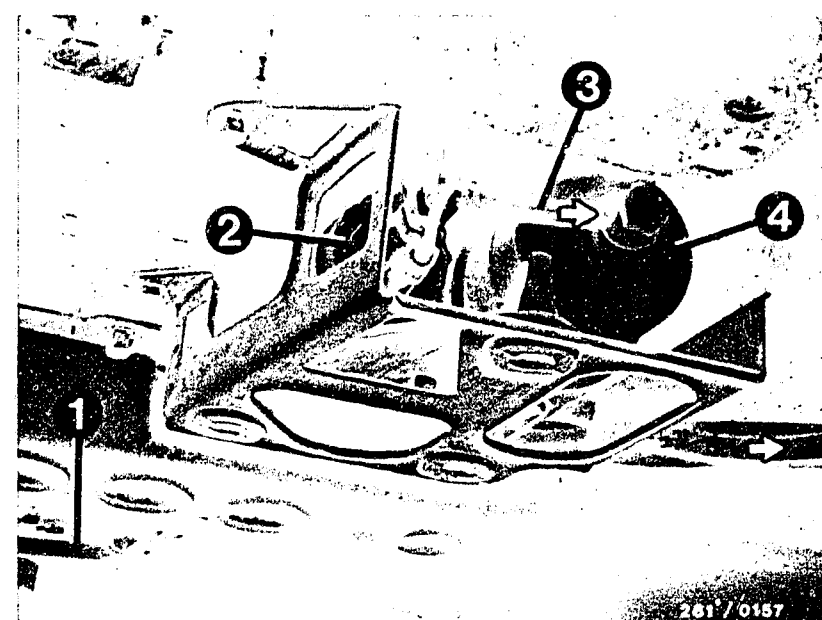
Yes

Continued on K 11/K 12



- 1 = Vacuum hose
- 2 = Pressure regulator
- 3 = Fuel return line

- 1 = Fuel intake line
 - 2 = Electric fuel pump
 - 3 = Fuel delivery line
 - 4 = Fuel filter
- Arrows = Direction of flow



K9

No maximum engine power
Volvo 760 Turbo



K10

No maximum engine power
Volvo 760 Turbo



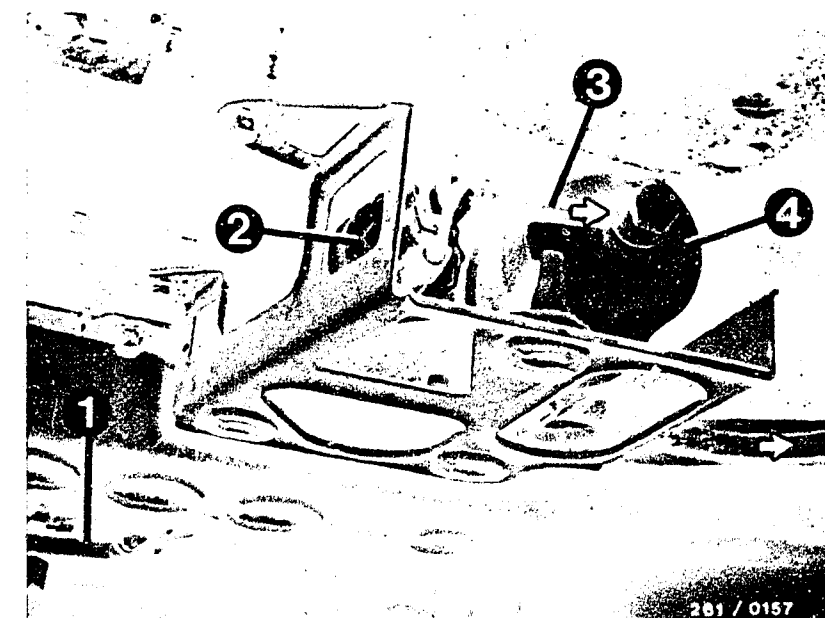
No maximum engine power / top speed cannot be reached (continued)

Trouble-shooting (continued)

- Check pre-supply pump
Listen: Loosen one electrical connection on electric fuel pump. Switch on fuel pump. On test adapter program switch "V" at position 17. Switch on ignition and press button T3. Pre-supply pump must operate. If not, check connecting leads and if necessary replace pre-supply pump.
- Fuel pressure regulator defective → replace.
- Fuel pump delivery too low → replace fuel pump.
- Strainer or pre-supply pump in tank clogged?
Corrosion in tank?
- Charge-air pressure too low:
Air-carrying parts leaking, bypass air valve leaking, wastegate not closing, shaft in turbo-charger broken.
- Charge-air pressure too high:
Control line clogged, control line leaking, diaphragm of wastegate broken and wastegate sticking (not opening).
Control-pressure line defective or incorrectly energized.

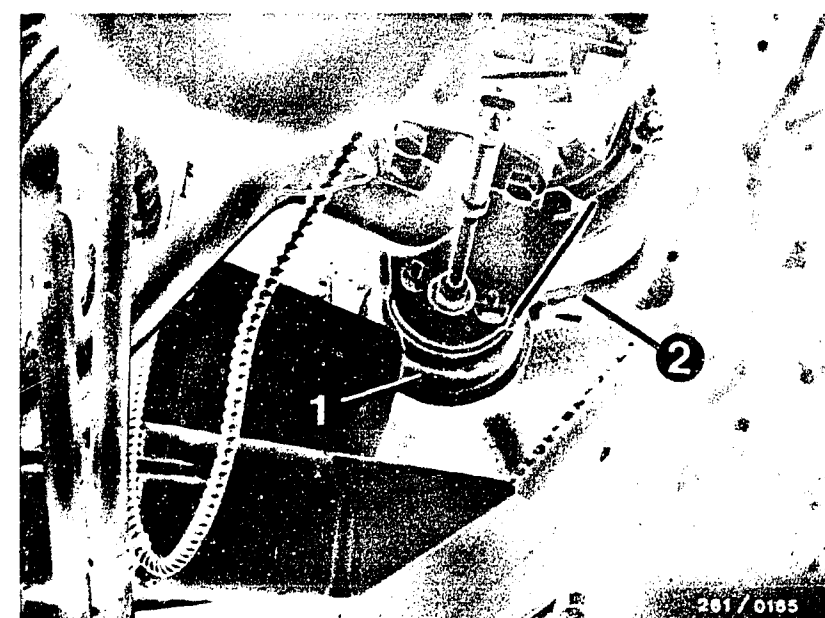
Yes

Continued on K 13/K 14



1 = Fuel intake line
2 = Electric fuel pump
3 = Fuel delivery line
4 = Fuel filter
Arrows = Direction of flow

1 = Wastegate
2 = Control line



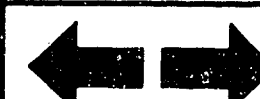
K11

No maximum engine power
Volvo 760 Turbo



K12

No maximum engine power
Volvo 760 Turbo



CO adjustment ad idle too low or too high (continued)

Yes

Are all hose lines and electric leads securely attached?
Visual examination.
Is the air-intake system leak-tight?

No

Check whether hoses of air-intake system and of fuel line system are securely attached, not kinked or damaged. If necessary, replace hoses. Eliminate leaks with new seals or by re-tightening the connecting screws.

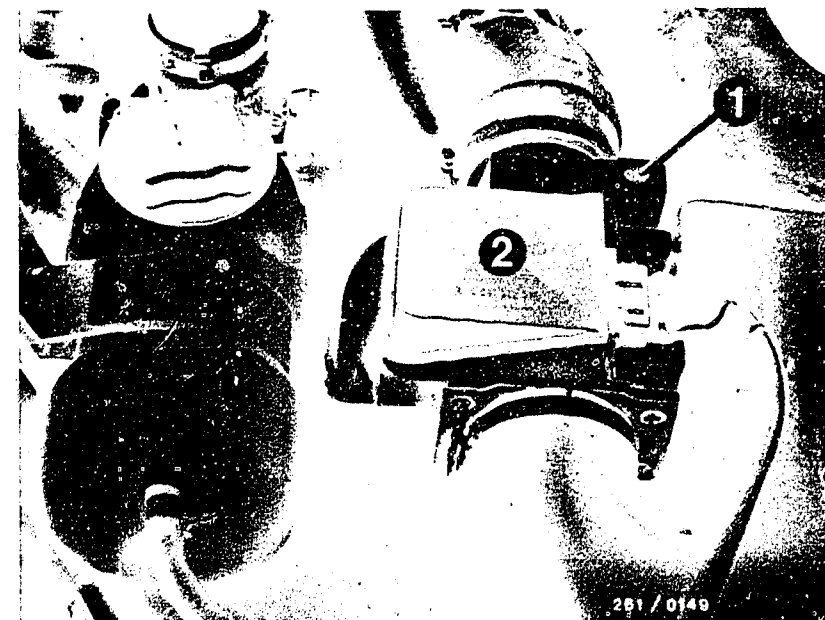
Leak test:

Seal off exhaust tail pipe. Unscrew top part of air filter on air-flow sensor and seal off air-flow sensor duct. Remove hose after auxiliary-air device and using compressed-air gun blow air (0.3 bar gauge pressure) into intake manifold. Seal off connection port on auxiliary-air device. Open throttle valve fully while doing this. Brush or spray all joints with soapy water. Bubbling or foaming indicates a leak.

Check electrical plug-in contacts for loose contact.

Yes

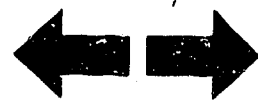
Continued on K 23/K 24



1 = Idle-speed-adjusting screw
2 = Air-flow sensor with NTC I

K21

CO adjustment
Volvo 760 Turbo



K22

CO adjustment
Volvo 760 Turbo



No maximum engine power / top speed cannot be reached (continued)

Yes

Are all hose lines and electric leads securely attached?
Visual examination.
Is the air-intake system leak-tight?

No

Check whether hoses of air-intake system and of fuel line system are securely attached, not kinked or damaged. If necessary, replace hoses. Eliminate leaks with new seals or by re-tightening the connecting screws.

Leak test:

Seal off exhaust tail pipe. Unscrew top part of air filter on air-flow sensor and seal off air-flow sensor duct. Remove hose after auxiliary-air device and using compressed-air gun blow air (0.3 bar gauge pressure) into intake manifold. Seal off connection port on auxiliary-air device. Open throttle valve fully while doing this. Brush or spray all joints with soapy water. Bubbling or foaming indicates a leak. Check electrical plug-in contacts for loose contact.

Yes

Testing completed for customer complaint

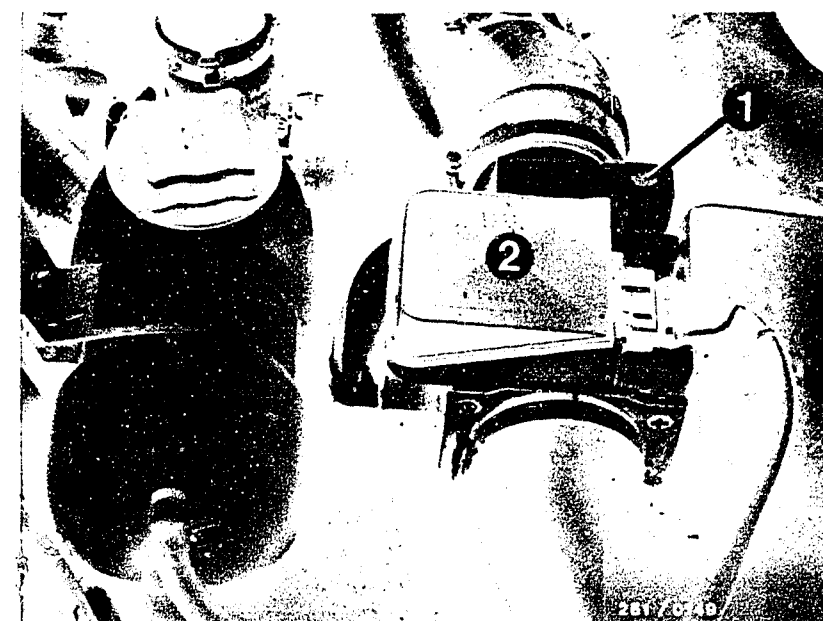
"No maximum engine power".

Customer complaint remedied?

no

Further possibilities:

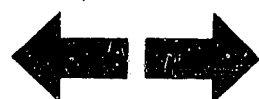
- Customer complaint incorrectly diagnosed (see Coordinates B3...B10). If the fault has not been detected by "direct trouble-shooting", see "detailed trouble-shooting" (Coordinate B3/B4).
- Engine not mechanically O.K. (Compression, valve setting, valve timing, worn camshaft).



1 = Idle-mixture-adjusting screw
2 = Air-flow sensor with NTC I

K13

No maximum engine power
Volvo 760 Turbo



K14

No maximum engine power
Volvo 760 Turbo



CO ADJUSTMENT AT IDLE TOO LOW OR TOO HIGH

Trouble-shooting program according to customer complaint

How to use the following trouble-shooting program

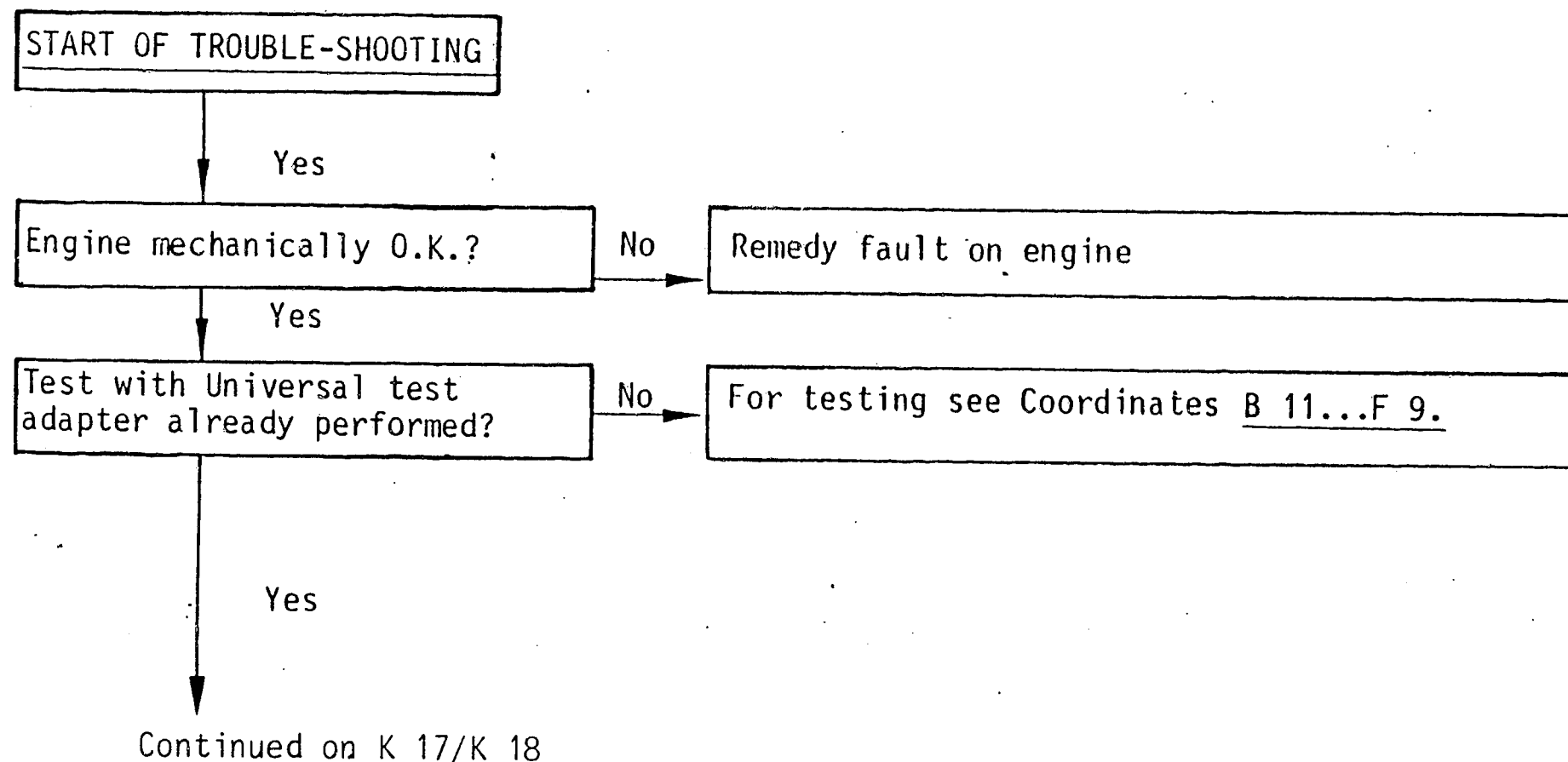
The program is divided into 3 rows of boxes:

1. The left-hand row contains the questions on the tests.
2. The middle row contains descriptions of the testing and adjustment operations on the components.
3. The right-hand row contains the illustrations belonging to the text and explains the illustrations.

If the questions can be answered conclusively with "yes" without testing, proceed to the next question below.

If, on the other hand, the answer to the question is "no", and you suspect a fault, branch to the middle row of boxes and carry out the tests given there.

When you have finished testing continue trouble-shooting at the point at which you branched off.



K15

CO adjustment
Volvo 760 Turbo



K16

CO adjustment
Volvo 760 Turbo



CO adjustment at idle too low or too high (continued)

Yes

Check secondary pattern of all cylinders at cranking speed. Secondary pattern O.K.?

No

Check ignition coil and high-voltage distributor. Check distributor cap for dirt and arcing damage. Make sure that the plastic part is installed in the mounting slot of the high-voltage distributor. With this plastic part the high-voltage distributor is correctly adjusted. Note the cylinder numbers when connecting the H.T. cables. Do not forget screening cover. Check ignition coil primary for continuity (approx. 0 Ω). Secondary resistance: 5 to 7.2 k Ω . Test interference-suppression resistors, H.T. ignition cables and spark plugs.

Interference-suppression resistor in

Distributor rotor:	1 k Ω
Distributor outer dome:	1 k Ω
Distributor center dome:	0 k Ω
Spark-plug connector:	5 k Ω
Ignition coil:	0 k Ω

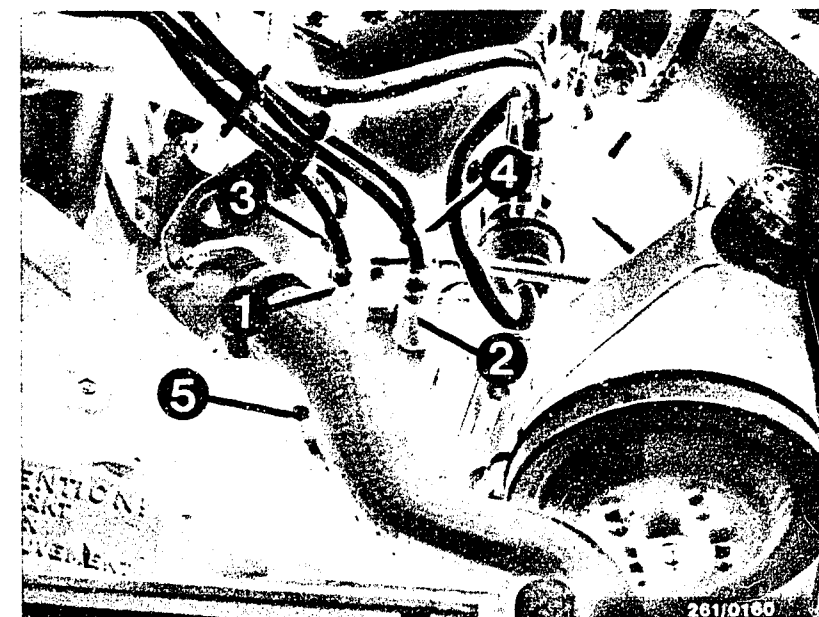
Yes

Air-flow sensor O.K.?

No

Testing: Open air-flow sensor flap by hand. It must be possible to open the air-flow sensor flap with uniform ease from its fully closed position to its fully open position. When released, the flap must close completely by itself. When the air-flow sensor flap is opened it must not catch at any point. Watch for any indications of abrasion or rubbing. Clean air-flow sensor if the inside is very dirty and rub out with a lint-free cloth. If there are any signs of abrasion or rubbing, replace the air-flow sensor.

Continued on K 19/K 20



1 to 4 = cylinder numbers
5 = fastening screw

K17

CO adjustment
Volvo 760 Turbo



K18

CO adjustment
Volvo 760 Turbo



CO adjustment ad idle too low or too high (continued)

Yes

Start valve O.K.?
(Leak test)

No

Testing the start valve for leaks:

1. When installed

Switch over directional-control valve of pressure gauge so that start valve is disconnected from fuel-distribution pipe. If engine now runs, replace start valve.

2. When removed

Remove start valve (Caution! Fire hazard!)

Fuel line and electric lead remain connected (place collector vessel under the start valve).

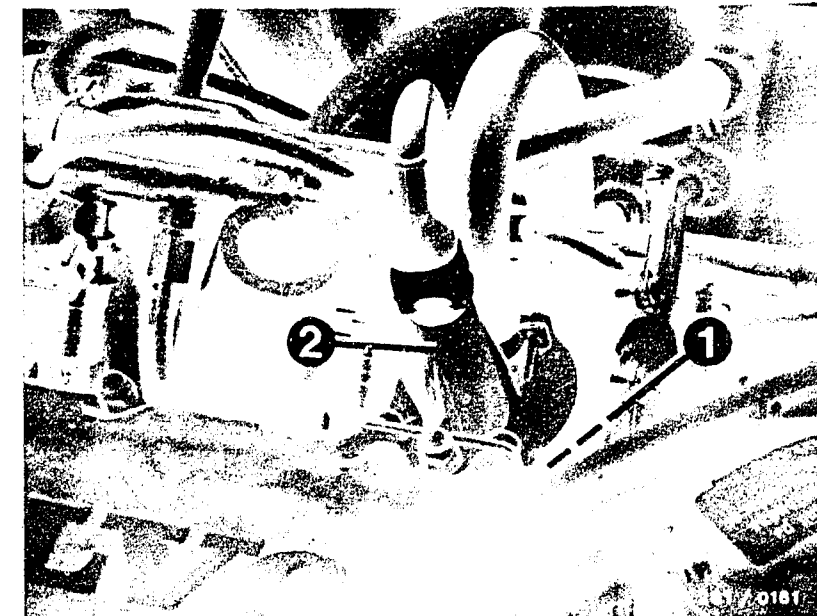
Build up fuel pressure:

On the universal test adapter set the program switch "V" to position 17. Switch on the ignition and press button T 3.

Test specification: Within one minute max. 1 drop may form at the mouth of the valve.

Yes

Continued on K 21/K 22



1 = Start valve

2 = Auxiliary-air device

K19

CO adjustment
Volvo 760 Turbo



K20

CO adjustment
Volvo 760 Turbo



CO adjustment at idle too low or too high (continued)

Yes

Exhaust-gas test with CO analyzer with engine at normal operating temperature

Checking value:

1.0 ... 2.5 % by vol. CO

Setting value:

1.5% by vol. CO

No

Requirement: Idle speed 850 min⁻¹.

Remove plastic plug in air-flow sensor.

- CO concentration too low:

Turn bypass screw in air-flow sensor gradually in a clockwise direction (turning to the right).

- CO concentration too high:

Turn bypass screw in air-flow sensor gradually in a counterclockwise direction (turning to the left).

After completing adjustment, use new plug (red).

Yes

Testing completed for customer complaint

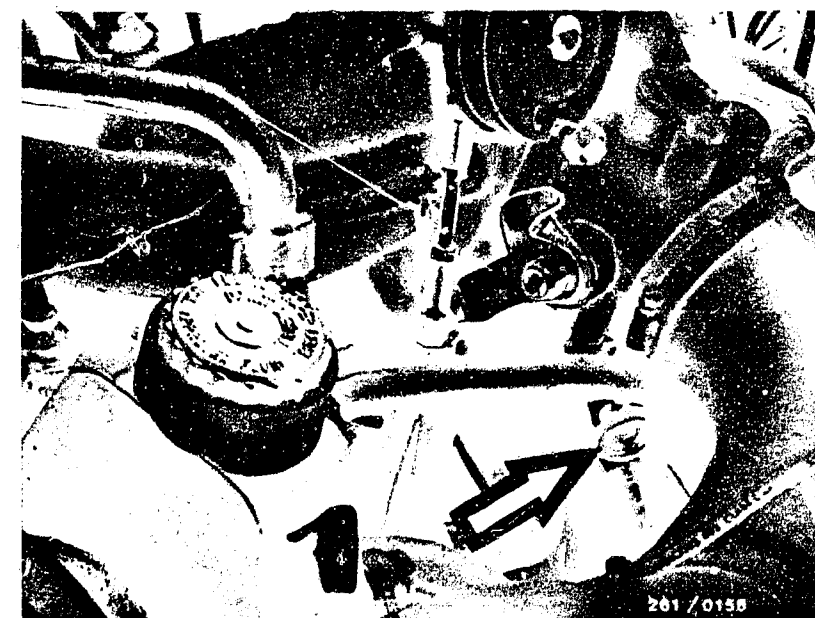
"CO adjustment at idle too low or too high"

Customer complaint remedied?

No

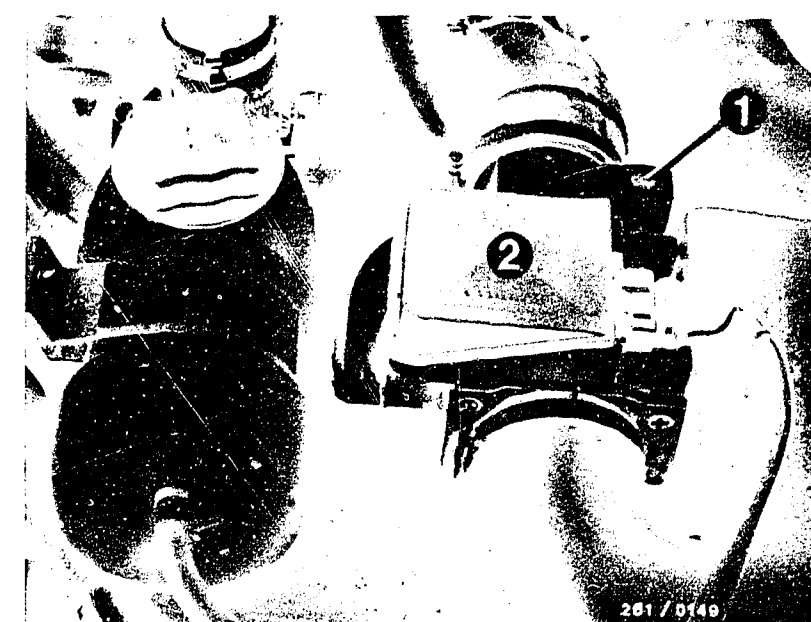
Further possibilities:

- Customer complaint incorrectly diagnosed (see Coordinates B3...B10). If the fault has not been detected by "direct trouble-shooting", see "detailed trouble-shooting" (Coordinates B3/B4).
- Engine not mechanically O.K. (Compression, valve setting, valve timing, worn camshaft).



Arrow = Idle-speed adjustment

1 = Idle-mixture-adjusting screw
2 = Air-flow sensor with NTC I



K23

CO adjustment
Volvo 760 Turbo



K24

CO adjustment
Volvo 760 Turbo



After-sales Service

Technical Bulletin

Not to be communicated to any third party

13...39

VDT-I-261/102 En

6.1983

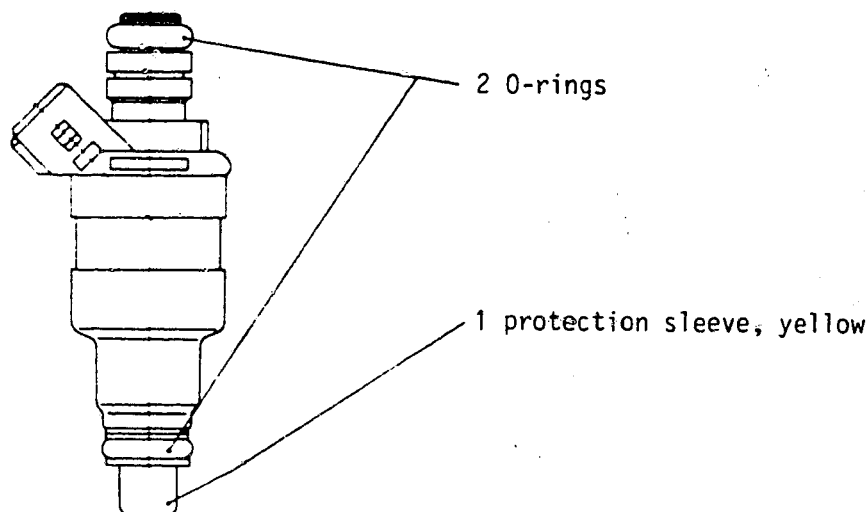
PARTS SET FOR SOLENOID-OPERATED INJECTION VALVES
0 200 150 2..

Supersedes 8.1982 edition

AND PRESSURE REGULATORS 0 280 160 2..

A common parts set is available for the Motronic solenoid-operated injection valves and pressure regulators with the new method of connection.

Contents for 1 injection valve:



Contents for pressure regulator:
1 O-ring
1 supporting plate

Since the above-mentioned parts are subjected to extreme temperature stress, they should be exchanged for new parts whenever servicing is carried out.

"Unmetered air" sucked in through injection-valve seals which are not tight, is a frequent case for servicing.

The parts set has the part number 1 287 010 704 and will in future be listed in the service parts microfiche under solenoid-operated injection valves (see EE 00 under 0 280..).

Please direct questions and comments concerning the contents to our authorized representative in your country.

BOSCH

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L1

Technical Bulletin

Volvo 760 Turbo



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